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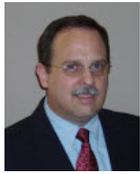
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Student Motivation: Do Midterm Grade Notifications Motivate Students to Earn Higher Final Course Scores?

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Student Motivation: Do Midterm Grade Notifications Motivate Students to Earn Higher Final Course Scores?

Abstract

Student motivation may be intrinsic (self-determined to perform) or extrinsic (grades, privileges, external consequences) as noted by Williams & Stockdale (2004, p. 214). A study of 228 undergraduate midwestern college students was assessed for potential student increased motivation after a midterm grade notification in comparison to their final course grades. The study revealed that students earning less than an 80% score at the notification did statistically significantly increase their final course grade ($p = 0.000$, $N = 52$) as tested by the non-parametric Wilcoxon Signed-Rank Test. This level of statistical significance was also evidenced for students earning 80% through 100% scores ($p = 0.000$, $N = 176$). Although when these same students were aggregated together, the statistical significance was not present ($p = 0.242$, $N = 228$). A combination of intrinsic and extrinsic motivation factors appears to be apparent when students are assessed for a given midterm grade notification category.

Introduction

The motivation for students to enter college is not always apparent. While parents encourage their children to obtain a college degree, their prodigies often appear to lack enthusiasm in the parent-prescribed endeavor. The need for academic success on the part of the student can also appear to be somewhat lacking in college courses once the dormitory room dust has settled and their parents have driven back home. Faculty see this on a reoccurring basis in their classrooms: "Johnny and Susie won't show up for class or turn in assignments. How do I motivate them?" Naturally this results in non-optimal grades for each student exhibiting this behavior. The reason for this poor performance could be due to a boring teacher, or it could be a lack of motivation on the part of the student.

This study was created to examine one very small element that may, or may not, increase student motivation toward higher levels of academic performance. At one midwestern university, midterm grade notifications are sent to students for two reasons: 1) alert students of their course grades, and 2) encourage non-serious students to get serious about participation in their courses to earn a better final course(s) grade. While the study is not designed to investigate the many variables of student motivation, it may help academics, and parents, to see if midterm grade notifications are having any positive effects on our leaders of tomorrow.

Significance, Purpose, and Usefulness of the Study

The student motivation study was created to learn if final college-level course grades were affected by midterm grade notifications. Per Breen & Lindsay (2002, p. 694), goal-oriented (grades) motivation is under researched. The methodology of this study is like the Cudney and Ezzell (2017, p. 33) measurement of student motivation at both the starting and end of the semester. Also, it is hopeful that this knowledge, and the literature review in this study, will help educational faculty and industrial trainers develop other ways to motivate students to perform at a high academic level.

Research Question and Hypothesis Statements

The research question is simple and basic: Do midterm grade notifications motivate students to ultimately earn higher final course grades? This research question resulted in the need to test the following null and alternative hypotheses depending on their respective midterm assessment grade (0 to 80%; 80% through 100%; 0% through 100% earned grade percentage by students).

- H01: $\mu_1 = \mu_2$. There is no statistically significant difference between midterm and final course grades when students [at a grade of less than 80%] were notified of their course grade status after the midterm assessment.



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- HA1: $\mu_1 \neq \mu_2$. There is a statistically significant difference between midterm and final course grades when students [at a grade of less than 80%] were notified of their course grade status after the midterm assessment.
- H02: $\mu_1 = \mu_2$. There is no statistically significant difference between midterm and final course grades when students [at a grade of 80% through 100%] were notified of their course grade status after the midterm assessment.
- HA2: $\mu_1 \neq \mu_2$. There is a statistically significant difference between midterm and final course grades when students [at a grade of 80% through 100%] were notified of their course grade status after the midterm assessment.
- H03: $\mu_1 = \mu_2$. There is no statistically significant difference between midterm and final course grades when all students [at a grade of 0% through 100%] were notified of their course grade status after the midterm assessment.
- HA3: $\mu_1 \neq \mu_2$. There is a statistically significant difference between midterm and final course grades when all students [at a grade of 0% through 100%] were notified of their course grade status after the midterm assessment.

Assumptions of the Study

The following assumptions were made for this study:

1. Optimal final course grades are tied to student motivation.
2. Students at less than an 80% midterm grade are more motivated to increase their final course grade.
3. Students at 80% through 100% midterm grades are motivated to maintain their scores in order to earn a high final course grade.
4. Student-to-faculty interaction and teaching styles did not affect the study.
5. Student motivation and performance were not affected by course delivery type (face-to-face, hybrid, or 100% online).
6. Students participated to the best of their ability in each course studied (in course topical areas of applied engineering, construction management, engineering technology, and technology management).
7. The study is not biased to or against any student type (undergraduate or graduate), gender (female or male), age, cultural background, or their assessment midterm grades.
8. Grades earned by students are generalizable to any student participating in the courses assessed.
9. Mobile learning was not considered since there is very little research on it (Zahrani & Laxman, 2015, p. 86)
10. Wilcoxon Signed-Rank Test variables are continuous and are non-parametric (non-normal).

Limitations of the Study

The following limitations are present for this study:

1. Students were both domestic and international and took a variety of courses at one Midwestern university.
2. Some students may have lacked motivation to earn a higher final course grade.
3. Students may not have been academically prepared to take university-level courses.
4. Violation of any of the Wilcoxon Signed-Rank Test assumptions would have created a limitation.
5. The results of this study may not be repeatable at another educational institution due to the breadth of variables that can affect the academic motivation of any given student.
6. Midterm grade notifications may have no effect on student motivation towards final course grade levels.

Literature Review

BASICS OF MOTIVATION

Motivation has been studied by many educators and industrial entities; and is considered one of the most important elements that a student needs to achieve at high-levels academically (Rowell & Hong, 2013; Isaksen, Treffinger & Dorval, 2011; Steinmayr & Spinath, 2009; Zimmerman, 2008; Collins & Amabile, 1999). While grades are used to measure student performance, reasons and outcomes of motivation are many as studied by academics (Breen & Lindsay, 2002, p. 694). Whatever the reason, a lack of student motivation can result in significantly lower course grades (Rowell & Hong, 2013; Scheel, Mad-



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His industrial experience includes currently working with R&D/ Leverage in the area of additive manufacturing, as well as past work internationally at Advanced Engineering Techniques in Sheffield, England, and locally at GE Transportation in Warrensburg. His research interests are in robotics, automation, additive manufacturing, and bioinspiration.

abhushi, & Backhaus, 2009; Wigfeld, Lutz, & Wagner, 2005).

Business professionals “assume an ethical charge and duty to maintain a level of knowledge and currency in a chosen field” (Baughman, Brumm, & Mickelson, 2014, p. 3; Bales, 1981). Due to this “ethical charge for business professionals”, and the review of literature for this manuscript, one can surmise that motivation is directly tied to a student’s ability and desire to learn new technologies and understand the implications that exist. While not addressing motivation directly, Fazarro, Newberry, Trybula, & Hyder (2012), gave the example of nanotechnology as such a technology requiring informed and capable students-turned-employees. This links well with the notion that a student’s future time perspective (how they see themselves in the future) affects their attitude and goals towards academic achievement (Kauffman & Husman, 2004, p. 4). Academic study prepares this future with evaluation and problem-solving capabilities to attain a career (Johnson & Bartsch, 2017, p. 3; Gibson & Bamford, 2001).

Motivation is “the power expended when starting, continuing, and finishing a process, and would be described as stimulation that drives students to hold positive attitudes about a course, including feeling inspired, enthused, fascinated, and involved regarding the course (Chory-Assad, 2002, p. 62).” Motivation is also “the process whereby goal-directed activity is instigated and sustained (Sweetland, 2015, p. 31; Schunk, Pintrich, & Meece, 2008, p. 4).” In terms of education, “motivation with respect to students refers to intrinsic motivators and extrinsic motivators. Intrinsic motivation refers to a student’s fascination with a subject, the perceived relevance of the topic, and sense of accomplishment with understanding the content. Extrinsic motivators include expectations from role models, grades, and can be affected by geographic and economic conditions (Cudney & Ezzell, 2017, p. 32; Kunanithaworn, Wongpakaran, Wongpakaran, Paibonsithiwong, Songtrijuck, Kuntawong, & Wedding, 2018, p. 1).” Williams & Stockdale (2004, p. 214) puts it this way, “intrinsically motivated behavior is self-determined and extrinsically motivated behavior is shaped by external consequences; extrinsic rewards consist of: grades, stickers, coupons, tokens, notes sent home, and privileges.”

Student-Derived Poor Academic Performance

Poor student academic performance may be directly related to perceptions of being under-rewarded, and non-satisfied, for the level of effort put forth (Bollinger & Martindale, 2004; Chory-Assad, 2002, p. 59; Pfeffer, J. & Langton, N., 1993; Sweetland, 2015, p. 24). While some students may want to learn, they lack the tools to succeed – hence become discouraged and give up. Other students fail an assessment through non-preparation, then once a low score is earned, give up blaming the course topics or faculty member. This results in not studying or preparing for the next activity or assessment (Rowell & Hong, 2013, p. 161). Other students may have low-levels of family support, grade levels, and even gender may result in amotivation (a lack of motivation; perceived competence, or failure to value an activity or its’ outcomes) (Kunanithaworn, Wongpakaran, Wongpakaran, Paibonsithiwong, Songtrijuck, Kuntawong, & Wedding, 2018, p. 2). In essence, their system of beliefs, perceptions, goals, and values, may totally lack any motivation for academic success (Rowell & Hong, 2013, p. 160).

Per Ariani (2017), a lack of motivation could be due to academic burnout (a lack of academic engagement). Breen and Lindsay (2002, p. 693) state this lack of motivation a little differently: “students who survive, but underperform, waste their own time and resources, often become demoralized, and can demotivate their student peers and the academics who teach them.” “Students sometimes do not perceive the value of learning, even if there is an extrinsic reward (Williams & Stockdale, 2004, p. 219).” Researchers also feel that student performance is based upon the psychological makeup of the individual, and not the subject matter that a student is studying (Breen & Lindsay, 2002, p. 694). In quality management circles, “the percentage of human and system errors significantly increase when a system is not fool-proof (Zahrani & Laxman, 2015, p. 12).” This analogy could be applied to the absence or lack of student motivation. This is no identifiable system in place to ensure that a student is motivated in meeting, or exceeding, learning outcome objectives (Chopra & Kondapalli, 2015).

Poor Student Academic Performance as Bestowed by Faculty

Oftentimes, a student’s motivation level can be affected by non-motivation on the part of an educator (Rowell & Hong, 2013, p. 161). National polls indicate that educators are stressed to the level that they, the educator themselves, have a total disregard for high levels of student academic performance (Williams & Stockdale, 2004; Elam, 1989). This non-motivation on the part of the faculty mentor, is bound to

affect their students' level of motivation (Baughman, Brumm, & Mickelson, 2014, p. 3; Schwartz & Bryan, 1998). Students may also sense a lack of fairness on the part of their course educators. Per Chory-Assad (2002, p. 60; Leventhal, 1980), "fair procedures are those that are applied consistently, are based upon prevailing ethical standards, and are unbiased, accurate, correctable, and representative of all individuals concerned". Likewise, these same students may perceive a lack of course construction in synchronization in terms of learning outcomes, instructional design, and assessment methodology. This is a prerequisite before a course should be delivered to a student (Asunda & Ware, 2015, p. 89). Lastly, just like in the business world, faculty turnover can adversely affect remaining faculty who are called upon to re-energize and maintain high levels of student encouragement to obtain academically-motivated students. These faculty may lack motivation themselves, and hence lack the drive to help initiate and succeed in generating motivation on the behalf of their students (Chopra & Kondapalli, 2015, p. 4).

Tidbits for Increasing Student Academic Performance

Student motivation can be increased through enhanced self-efficacy beliefs/competence, belief in success, helping students to understand task value, achievement of mastery and learning goals, development of autonomy, and relating to student peers and faculty (Rowell & Hong, 2013, p 162). Higher levels of student motivation can also come about by relevant and challenging activities, and by providing positive academic feedback to students (Kauffman & Husman, 2004, p. 3; Williams & Stockdale, 2004, p. 225; Gambrell, 2001; Rugutt & Chemosit, 2009). Hasan and Kalid (2012, p. 33) found that achievement-motivated students perform statistically significantly higher than low achievers ($n = 187$). Furthermore, increased student motivation and academic success may come down to basic student mentoring – social interaction with encouragement and/or admonitions to do better, be better (Baughman, Brumm, & Mickelson, 2014, p. 3).

Key motivation-generation input variables to consider include: student-to-student relations, critical thinking skills, and student-faculty interactions. Rugutt and Chemosit (2009, p. 21-24) identified these variables as statistically-significant predictors of student motivation in a 2009 study with 2,190 students of varying genders and ages from 18 to greater than 31 years old. The Rugutt and Chemosit study aligns with the notion that student educational performance is directly tied to "any organized systematic, educational activity, carried on outside the framework of the formal system, to provide selected types of learning to a particular subgroup in the student population (Baughman, Brumm, & Mickelson, 2014, p. 3; Asunda & Ware, 2015)." This leads faculty back full-circle to be sure that they have student-derived motivation foundations in place of "attendance policies, schedules, grading scales, conduct, expectations, exams, and a course syllabus (Chory-Assad, 2002, p. 67).

Methodology

STUDY POPULATION AND TIME FRAME

Students participating in course topical areas of applied engineering, construction management, engineering technology, and technology management, were accessed for grade performance. Student grades were collected from the start of the fall 2017 through the spring of 2018 semester.

VARIABLES

Student grades were collected at the end of the 7th week and the 16th week (end of each course) for Wilcoxon Signed-Rank Test score-difference comparison. This statistical test was required due to the matched-samples condition of pre-test and post-test grades for each student (Field, 2009, p. 552). Variables such as class status (undergraduate or graduate), gender, age, course type (face-to-face, hybrid, 100% online), academic background, or cultural differences were not considered.

STATISTICAL ANALYSIS

Both midterm and final course grades were assessed for score differences using IBM SPSS Version 24.0 using a Wilcoxon Signed-Rank Test statistical analysis at a significance level of 0.05. As to the statistical test, per Field (2009, p. 552), a Wilcoxon Signed-Rank Test compares score differences to determine the sign of the differences (positive or negative) towards calculation of statistical significance. This statistical test is equivalent to the Dependent (Paired Samples) T Test [for parametric (normally-distributed data); Field (2009, p. 329)] which measures the average difference between one assessment to the next, for one data measurement on one individual, and then tallies the averaging information of all data sets, for

all individuals, to determine if a statistical difference exists between pre-test and post-test results.

Statistical Assumption Testing

Continuous data was present and hence no assumption test was necessary. Whereas, the score differences for the Wilcoxon Signed-Rank Test assumed that the data was non-parametric (non-normal). Figure 1 provides graphical score-difference non-normality results of the midterm and final course grades when students are at a grade of less than 80% were notified of their course grade status after the midterm assessment. Statistically per the Kolmogorov-Smirnov test, non-normality was confirmed with $D(52) = 0.155$, $p = 0.003$.

Figure 1. Score difference for students at a midterm assessment grade of less than 80%

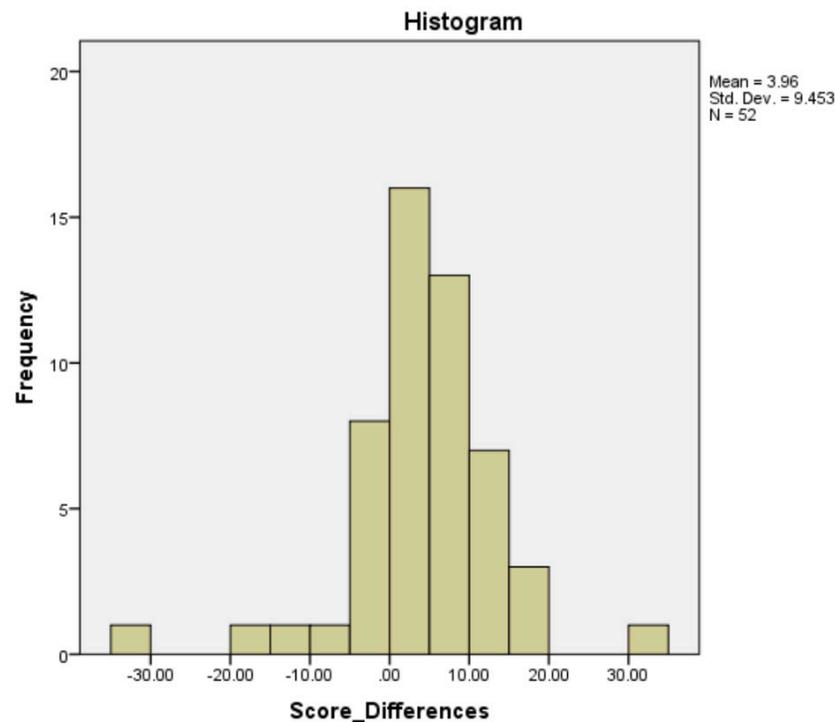


Figure 2 provides graphical score-difference non-normality results of the midterm and final course grades when students are at a grade of 80% through 100% were notified of their course grade status after the midterm assessment. Statistically per the Kolmogorov-Smirnov test, non-normality was confirmed with $D(176) = 0.078$, $p = 0.012$.

Figure 2. Score difference for students at a midterm assessment grade of 80% through 100%

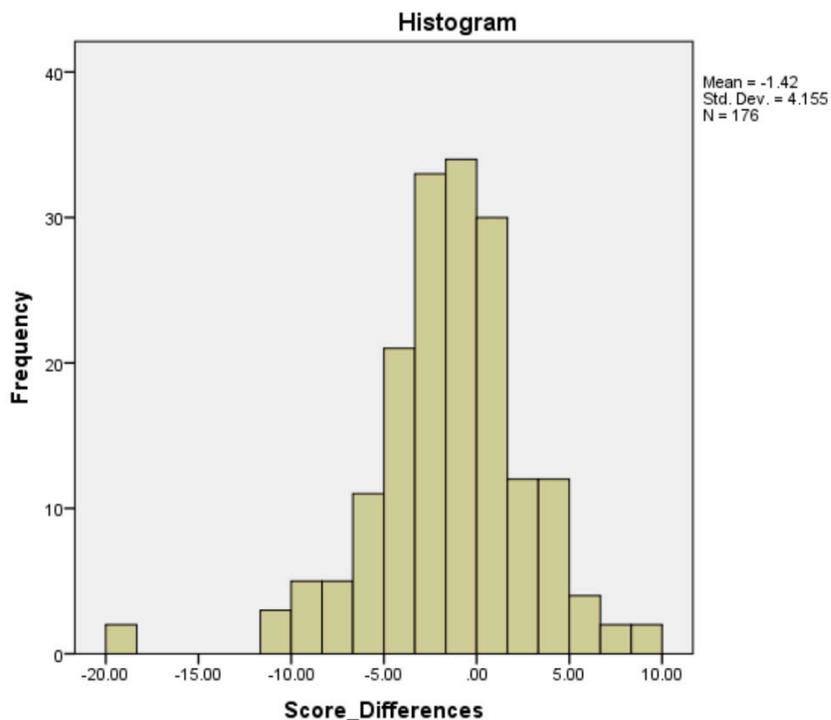
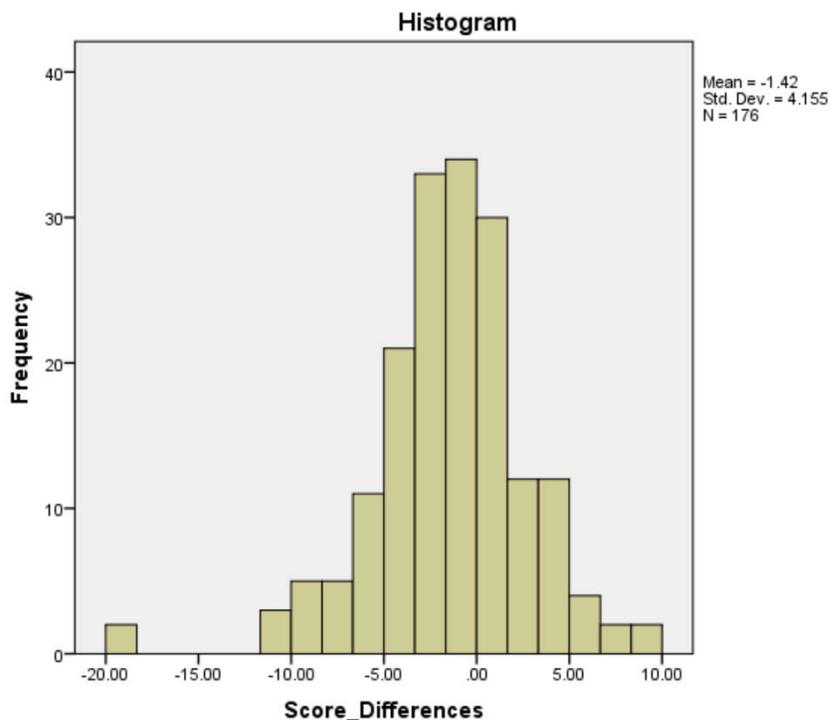


Figure 3 provides graphical score-difference non-normality results of the midterm and final course grades when all students [at a grade of 0% through 100%] were notified of their course grade status after the midterm assessment. Statistically per the Kolmogorov-Smirnov test, non-normality was confirmed with $D(228) = 0.096$, $p = 0.000$.

Figure 3. Score difference for all students at a midterm assessment grade between 0% through 100%



Statistical Study Results

HYPOTHESIS 1

There was a statistically significant difference between midterm and final course grades when students [at a grade of less than 80%; $N = 52$] were notified of their course grade status after the midterm assessment. Consequently, the null hypothesis was rejected and the alternative hypothesis was retained with midterm course grades, $Mdn = 73.65\%$, and the subsequent notification, resulted in final course grades, $Mdn = 77.53\%$, $z = -3.561$, $p = 0.000$, $r = -0.349$. Per Cohen's Criteria for r , this was a moderate effect size (Minium, Clarke, & Coladarci, 1999, p. 73). This level of effect size means that while statistically significant, the difference in medians is moderate.

HYPOTHESIS 2

There was a statistically significant difference between midterm and final course grades when students [at a grade of 80% through 100%; $N = 176$] were notified of their course grade status after the midterm assessment. Consequently, the null hypothesis was rejected and the alternative hypothesis was retained with midterm course grades, $Mdn = 92.63\%$, and the subsequent notification, resulted in final course grades, $Mdn = 91.70\%$, $z = -4.424$, $p = 0.000$, $r = -0.236$. Per Cohen's Criteria for r , this was a small effect size (Minium, Clarke, & Coladarci, 1999, p. 73). This level of effect size means that while statistically significant, the difference in medians is small.

HYPOTHESIS 3

There was no statistically significant difference between midterm and final course grades when students [at a grade of 0% through 100%; $N = 228$] were notified of their course grade status after the midterm assessment. Consequently, the null hypothesis was retained and the alternative hypothesis was rejected with midterm course grades, $Mdn = 89.37\%$, and the subsequent notification, resulted in final course grades, $Mdn = 89.38\%$, $z = -1.170$, $p = 0.242$, $r = -0.077$. Per Cohen's Criteria for r , this was a small effect size (Minium, Clarke, & Coladarci, 1999, p. 73). This level of effect size means that while it was not statistically significant, the difference in medians is small.

Conclusions and Future Research

Based upon the study results, it appears that potentially intrinsic and extrinsic motivated behavior is a factor in motivating students with midterm grade notifications towards an improved final course grade. Students earning midterm grades at less than 80% seems to have been more extrinsically-motivated (grades, external consequences) due to the increase in median grades. Whereas students earning midterm grades from 80% through 100% may possibly be more intrinsically-motivated (self-determined; personal fulfilment motivator).

It is interesting that the entire group of students ($N = 228$) did not result in a rejection of the null hypothesis and when the two groups were merged, there was a net-cancellation of grade/score differences, resulting in non-statistical significance. Greater category segregation of the midterm grade levels (0% through 60%; 60% through 70%; 70% through 80%; 80% through 90%; 90% through 100%) was considered for the study, but it was felt that a lower N number in each category would skew the hypothesis testing results.

This study adds a small degree of statistical weight to the notion that midterm grade notifications do help students to "redirect their efforts." Hopefully faculty, administrators, and students will use these results, and the supporting literature review, to help all faculty to see the benefits of notifying students of their course progress. Even if the notification is only once each semester, the lower-scoring student might be motivated and have an academic chance to improve their final course grades.

For future research, consider obtaining more data. While the N value of 228 was respectable, increasing this value four-or-five-fold could provide academic researchers with statistical significance for all students; where categorial segregation does not matter. This may also make it possible to use the parametric (normal distribution) Dependent (Paired) T Test instead of the non-parametric Wilcoxon Signed-Rank Test. Lastly, investigate other potential variables that may be affecting student motivation. Poll students on what motivates them beyond a midterm grade notification and the final course grade. The missing motivational link may be waiting to be discovered in such a student motivation poll.

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