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JUST REWARDS: IMPROVING LEARNING OUTCOMES BY RAISING JUSTICE PERCEPTIONS

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ABSTRACT

This paper describes an empirical analysis of alternative grading methods and their effect on students' perceptions of distributive, procedural, and interactional justice in the classroom. Undergraduate students enrolled in a business course completed half the course with a traditional grading system and half the course with an automated grading system which provided specific feedback on the errors committed. The automated grading system produced significantly higher levels of all three varieties of justice ($p<.0001$). The second phase of this study assessed whether or not the measured increases in justice perceptions were correlated with changes in practical classroom outcomes. Further analysis demonstrated that these higher justice perceptions were associated with higher levels of planned effort ($p<.05$), self-efficacy ($p<.001$), and overall course satisfaction ($p<.001$). Implications for classroom teaching, both on the question of manual vs. automated grading, and on the issue of student vs. faculty evaluations of classroom justice are included.

INTRODUCTION

At its most basic level, grading is simply the process of assessing a student's work and assigning a corresponding letter or number (Speck, 1998; Tchudi, 1986). But despite their familiarity with this process, faculty and students often perceive the grading process (and the grades it produces) from starkly different perspectives (Holmes & Smith, 2003). Whereas faculty tend to

perceive grades as an avenue for objective feedback and a potential source of motivation (Walvoord, 1986) students frequently view grades as a form of compensation for their efforts, thus resenting a low grade as a form of underpayment (Folger & Konovsky, 1989). Beyond practical concerns such as these, educational scholars argue that the grading process is also rich with ethical overtones, both in terms of how individual grades are assigned and in terms of the faculty member's responsibility to clearly communicate the student's performance (Sabini & Monterosso, 2003).

Both the design and the implementation of classroom grading systems impact perceptions of classroom justice, a broad construct generally conceptualized as consisting of three distinct facets (Williams, 1999). *Distributive justice* deals with perceptions of outcomes, focusing in particular on equity comparisons among those receiving the rewards. Distributive justice assessments consider whether the course or assignment grade itself is fair, regardless of the process which produced it. In contrast, *procedural justice* examines the grading process, evaluating the course policies and instructor decisions for potential bias or inequity which might produce unfair or unrepresentative scores. Finally, *interactional justice* measures perceptions of the feedback's usefulness, including timeliness, relevance, accuracy, and other aspects of the information returned (Leventhal, 1980).

A student receiving a course or assignment grade is likely to assess all three justice facets, and the student's attitude toward the course and the instructor may be strongly influenced by the results. Numerous positive workplace outcomes are associated with high justice perceptions; examples include improved acceptance of administrative decisions, greater cooperation (Lind & Tyler, 1988), higher incidence of pro-social behaviors (Cropanzano & Greenberg, 1997), and a reduced likelihood of engaging in anti-social activities (Greenberg, 1990).

In the classroom setting, perceptions of unfair grading are generally associated with negative outcomes. Students who believe they are receiving an unfair grade (low distributive justice) or who

believe the grading process itself is inequitable (low procedural justice) may experience increased tension, feelings of anger, or helplessness (Williams, 1999). In response these students may attempt to punish the instructor when completing course evaluations (Tata, 1999). Student assessments of grading fairness impact the student's perception of the course as a whole and can be expected to influence levels of effort, mirroring workplace findings that employees' fairness perceptions measurably impact workplace factors including job satisfaction and organizational commitment (Folger & Konovsky, 1989).

Given the potential impact of instructor grading decisions on student attitudes, as well as the potential outcomes associated with low and high justice assessments, both teachers and students have a stake in classroom administration decisions which influence justice perceptions. This paper empirically compares two alternative methods of providing course feedback in an attempt to assess their impact on justice perceptions. Phase I of the study examines how grading procedures influence justice perceptions, while Phase II empirically tests whether these justice perceptions do in fact produce the predicted attitudinal and behavioral outcomes in students.

PHASE 1

Method

Two distinct grading methods were employed in order to assess whether automated grading can improve justice perceptions among students. Students enrolled in a Business Statistics lab during the Spring 2007 (n=70) and Fall 2007 (n=57) semesters were invited to participate in the study; no course credit was given for participation. Surveys were completed anonymously, and a coding system allowed pairing of individual response between the two rounds of data collection. Spring surveys were administered on paper, while the fall survey employed the same items administered electronically.

During the first half of the semester, student work was graded manually; the course grader was not informed of the study. Feedback consisted only of a numeric grade for each lab, and took as long as

three weeks to reach students. During week seven, students completed a survey measuring their justice perceptions of the course.

For the remainder of the course student work was graded electronically using Chexel software (Reeves, 2006), and assignments were returned with detailed feedback, often within 24 hours of submission. Following this phase of the study, students completed a second survey measuring justice perceptions.

The survey consisted of three justice measures, with responses given on a 7 point Likert-type scale anchored at Strongly Disagree and Strongly Agree; the items, reliabilities, and inter-item correlations ([name deleted for blind review], 2007) are provided in Appendix 1. The objective of this initial phase of the study was to determine whether student justice perceptions when given prompt, detailed feedback were higher than student justice perceptions with slower manual grading. The following specific hypotheses were assessed:

Hypothesis 1: Students receiving automated feedback will report higher perceptions of Distributive Justice than students receiving manual grading feedback.

Hypothesis 2: Students receiving automated feedback will report higher perceptions of Procedural Justice than students receiving manual grading feedback.

Hypothesis 3: Students receiving automated feedback will report higher perceptions of Interactional Justice than students receiving manual grading feedback.

ANALYSIS

The two sample groups were similar in terms of size, makeup, and academic experience, yielding 127 usable response pairs (each pair consisting of mid-term and end-of-term surveys from a single individual). The data was assessed using paired two-sample t-tests in

order to assess differences in scores between the automated and manual grading conditions.

Hypothesis 1. The first hypothesis proposed that students would report higher perceptions of distributive justice with automated grading than with manual grading. For this comparison the calculated value (t=5.687, df=126) was significantly above the critical value of 1.657 ($p<.0001$), hence Hypothesis 1 was supported.

Hypothesis 2. The second hypothesis proposed that students would report greater perceptions of procedural justice with automated grading than with manual grading. For this comparison the calculated value (t=6.262, df=126) was significantly above the critical value of 1.657 ($p<.0001$), so Hypothesis 2 was supported.

Hypothesis 3. The third hypothesis proposed that students would report greater perceived interactional justice with automated grading and feedback than with manual grading and feedback. In this comparison the calculated value (t=5.460, df=126) was significantly above the critical value of 1.657 ($p<.0001$), and Hypothesis 3 was supported.

DISCUSSION

This initial analysis raises several questions about how course feedback impacts student justice perceptions. The most intuitive conclusion regards *interactional justice* perceptions, which were higher with automated grading than with manual grading. Given both the greater level of detail and the more rapid turnaround with automated grading, such a result is hardly surprising, and in fact was to be expected.

Improved outcomes for the other two justice measures, however, are worthy of further examination. *Procedural justice* refers to a student's perception that the grading process is fairly structured and equitably carried out. In the present study students reported markedly higher procedural justice perceptions under automated

grading than under manual grading. While the specific reasons for this change were not examined in the survey, several possibilities exist. First, while the point value of the exercises is identical under both systems, students may conclude that they are receiving a more accurate assessment of their efforts with automated grading than with manual grading. This conclusion could result from the detailed feedback, which may help justify the assigned grade. Students might also assume that the simultaneous return of several manually graded labs implies that little time was actually spent grading them. Finally, students might be aware of the grader's relative lack of statistics knowledge, concluding that the automated system is actually more capable, or at least more consistent, in assessing their work.

Another possibility is that student perceptions of the grading process simply spilled over into their assessment of the general course administration, a halo effect of sorts which could have created the impression that the entire course was equitably conducted.

The notable improvements in *distributive justice* under automated grading are perhaps the most puzzling, given the relatively small impact the grading change had on most students' final grades. Despite this lack of any apparent connection, students' justice perceptions related to their overall course grade were overwhelmingly higher with the automated system. Perhaps this change is simply a result of the high correlation between the justice facets, suggesting that perceptions of fairness in the grading process spill over into perceptions of final grade fairness.

PHASE II

Method

As previously discussed, extensive research has linked higher justice perceptions to desirable workplace outcomes including higher job satisfaction and increased organizational commitment (Folger & Konovsky, 1989). The second segment of this study empirically assesses the hypothesized relationships between higher justice perceptions and beneficial outcomes to determine whether the expected outcomes materialized in the classroom. Extant research

links justice perceptions to several desirable end-states, including higher self-efficacy, higher levels of planned effort, improved affective states, and higher levels of general satisfaction.

Self-efficacy has been extensively studied in the workplace, and improvements in self-efficacy generally predict future performance (Nesbit & Burton, 2006). Higher self-efficacy has been linked to higher goal setting and higher levels of effort (Wood & Bandura, 1989), as well as reduced levels of task anxiety (Bandura, 1982). Because individuals with higher levels of self-efficacy believe they hold greater control over their situation they exhibit generally more positive attitudes toward the task in question. In the educational context, Nesbit and Burton's (2006) study of graduate students demonstrated that students who regard the grading process as unfair demonstrate reduced levels of self-efficacy, a change predicted to produce inferior learning outcomes. Thus, higher justice perceptions should be associated with higher levels of self-efficacy among learners.

Hypothesis 4: Higher justice perceptions will be associated with higher levels of self-efficacy.

Students, like most other individuals, continuously assess their inputs and outcomes to determine equity ratios (Adams, 1963). These ongoing equity assessments may be altered by perceptions that a reward system is unfair, or that efforts may not result in the desired outcomes; multiple classroom studies have supported this link between fairness perceptions and motivation (e.g.Christophel & Gorham, 1995; Gorham & Millette, 1997). Individuals who perceive a condition of under-reward tend to exhibit negative emotional responses including anger (Sprecher, 1986). In particular, perceptions of unfair under-rewards are associated with poor performance (Pfeffer & Langton, 1993), as employees reduce their efforts in order to restore perceived equity (Williams, 1999). It follows, then, that students who consider class administration inequitable can be expected to expend less effort on future assignments. Conversely, students who believe the class administration is equitable should anticipate making greater efforts on future assignments.

Hypothesis 5: Higher justice perceptions will be associated with higher levels of planned effort.

The prevailing perspective on justice effects holds that emotions play a central role in determining motivation and performance. In particular, negative affect has been demonstrated to increase as equity perceptions fall, in some cases resulting performance declines. However, the ultimate impact of anger has proven difficult to quantify; Williams (1999) found that while perceptions of inequity did produce anger, that anger did not measurably reduce future task performance. Given the mixed findings on this particular relationship, it appears necessary to assess whether justice perceptions have any measurable effect on either positive or negative affect.

Hypothesis 6a: Higher justice perceptions will be associated with higher levels of positive affect.

Hypothesis 6b: Higher justice perceptions will be associated with lower levels of negative affect.

As previously noted, extensive research has linked higher justice perceptions to positive workplace outcomes including higher job satisfaction and increased organizational commitment (Folger & Konovsky, 1989). Alexander and Ruderman (1987) demonstrated that employees who felt fairly-treated exhibited higher levels of satisfaction with their supervisors. Beyond these general workplace findings, extant research identifies specific outcomes in educational settings. Gorham and Millette (1997) asked faculty members and students to name factors which would raise or lower student motivation; both groups listed 'fair grading' as a motivator and 'unfair grading' as a demotivator. Based on the observed association between grading fairness and student satisfaction and motivation, it seems reasonable to predict that higher levels of perceived justice should be associated with higher levels of general course satisfaction.

Hypothesis 7: Higher justice perceptions will be associated with higher levels of course satisfaction.

ANALYSIS

Phase 2 utilized the same sample group as Phase 1 (n=127). Subjects from the original study group were randomly assigned to either a manual grading or an automated grading group. For each hypothesis, all three justice facet measures were included in a stepwise regression analysis; the significant variables for each model are noted below.

Hypothesis 4 predicted that higher levels of perceived justice would be associated with higher reported levels of self-efficacy. Significant relationships were identified for distributive justice ($p < .001$), interactional justice ($p = .006$), and procedural justice ($p = .042$); the combined regression model exhibited an R^2 of .397.

Hypothesis 5 predicted that higher levels of each justice facet would be associated with higher reported levels of planned effort. Analysis produced a model which included interactional justice ($p = .018$) and procedural justice ($p = .047$); the R^2 for this model was .126.

Hypothesis 6a predicted that higher levels of each justice facet would be associated with higher reported levels of positive affect. The model included only interactional justice ($p = .001$), while the R^2 was only .083. *Hypothesis 6b* predicted that higher levels of each justice measure would be associated with lower reported levels of negative affect. The model included only distributive justice ($p < .001$), while the R^2 was only .098.

Hypothesis 7 predicted that higher levels of each justice facet would be associated with higher reported levels of general course satisfaction. This hypothesis was supported only for distributive justice ($p < .001$), and the model R^2 was high at .418.

DISCUSSION

The analysis suggests that higher justice perceptions will be most strongly associated with increases in self-efficacy, course

satisfaction, and planned effort, suggesting that important benefits can be gained from efforts to improve students' justice perceptions. While statistically significant, the relationships between justice facets and both positive and negative affect appear to have little practical significance, each predicting less than 10% of the variance in the outcome variable.

From a pedagogical standpoint the automated grading system appears to offer a win-win solution. Students benefit both practically, from receiving prompt, more detailed grade feedback, and emotionally, as their confidence in the system improved. The course instructor also stood to benefit not only from fewer student complaints, but also from anticipated positive outcomes associated with higher justice perceptions; beyond the pleasant impact of higher student satisfaction, teachers can also anticipate greater effort resulting from improvements in classroom justice.

While most teachers undoubtedly believe their courses are equitably structured and administered, students do not always agree. While instructors may argue that this belief represents an unrealistic misperception on the part of the student, the fact remains that students who believe they are being treated unjustly tend to exhibit lower self-confidence and reduced effort. Ultimately, the decision to assess (and if necessary adjust) justice perceptions remains within the purview of the teacher; in many cases the solution may be as simple as improving communication with students about course administration and policies. Given the potential benefits, it seems reasonable for teachers to make such adjustments in the pursuit of positive learning outcomes.

Beyond the observed improvements in student justice perceptions and learning outcomes, the present study also illustrates that some disastrous starts may actually be remedied with mid-course modifications. In the present study students began receiving automated feedback after being primed for six weeks with low justice perceptions (as seen in their initial survey responses). Yet after six weeks with the automated system, satisfaction with the lab and positive affect were significantly higher, indicating a large shift in

student perceptions, and suggesting that a procedural change midway through the course can minimize the damage inflicted by previous administrative problems. It also seems likely that the actual act of making the change was, in itself, perceived as a sign of compassion on the part of the instructor, further boosting justice perceptions.

In conclusion, it appears that student justice perceptions appear largely within the control of the instructor. Given the consistently positive outcomes associated with higher justice perceptions, both in terms of learning and student attitudes toward the class, both faculty members and students appear to benefit when students perceive equitable treatment in the classroom.

LIMITATIONS

This study's results should be considered in the light of possible limitations. First, the fact that all subjects received the treatment conditions in the same order (manual grading followed by automated grading) might have biased the results of the surveys. Given the generally unfavorable response to manual grading it is possible that student enthusiasm for the new method was magnified and reflected in the subjects' responses on the second survey. The fact that the survey administration was changed from paper-and-pencil to electronic between semesters could have introduced unforeseen effects. Because the researcher was also the course instructor, it is possible that her actions or instructions to the students might have somehow prejudiced their responses. Finally, the fact that all subjects were business majors enrolled in the same course with the same instructor might have somehow biased the results.

FUTURE RESEARCH

While this study extends research on workplace justice into the academic setting, similar research in the classroom environment remains limited. Additional research is warranted in order to extend the present findings regarding desirable outcomes such as higher self-

efficacy and improved task performance. Further work is also needed to explore other behavioral and attitudinal changes which accompany rising justice perceptions. Additional statistical analysis is also desirable to assess the relationships among the distinct justice facets, particularly whether or not individual justice facets demonstrate mediating effects on other facets. A final area of interest involves justice perceptions and their relationship to teacher evaluation scores, assessing how perceived classroom justice influences student evaluations of teacher performance.

Mechanical grading in various forms has been employed in higher education since the mid-twentieth century. But the ability to provide automated feedback at a much higher level of detail is a relatively recent development, and offers the potential for impressive advances in classroom administration and grading. The present study suggests that students have no noticeable bias against such tools, and may in fact prefer the more structured, more objective feedback such tools can provide. Future research will be necessary in order to better understand the impact of such tools in the classroom setting.

CONCLUSION

This study attempts to extend our understanding of how instructor behavior, including feedback and grading, impacts student perceptions and attitudes. The analysis compared automated and manual grading techniques in order to assess their impact on classroom justice perceptions. The results demonstrated that more rapid, more detailed feedback improves student assessments of interactional, procedural, and distributive justice. These higher justice perceptions were also associated with multiple positive outcomes, including self-efficacy, planned effort, and course satisfaction. The results suggest that faculty who invest time and effort in improving student justice perceptions are likely to experience higher levels of student achievement.

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Appendix 1
Justice Measures: Individual items, Reliabilities, and Correlations

Distributive Justice: (□= .907)

1. Overall, my lab grades are a fair reflection of my understanding of the statistical concepts covered in lab.
2. Based on my level of effort, I am generally satisfied with my lab grades.
3. In general, my lab grades fairly reflect the effort I put into the assignments.
4. My lab grades are usually about what I expect based on my perception of the quality of my work.
5. Once I see my graded lab, I usually feel that my grade is fair.

Procedural Justice: (□= .827)

1. The grading of the lab assignments is unbiased (all students are treated equally).
2. When deducting points on a lab, the grader applies equivalent standards to all students.
3. A particular lab assignment is graded consistently across all students.
4. Some students receive preferential treatment by the grader (reverse coded).

Interactional Justice: (□= .877)

1. The feedback I have received on my labs has helped me better understand the statistical concepts we are covering.
2. The feedback I have received on my labs has prepared me to turn in higher quality lab assignments in the future.
3. If I look at my graded lab, I understand why I made the grade I received.
4. As the semester has progressed, I have developed a better understanding of what is required to make a high grade on a lab assignment.
5. By looking at my graded lab, I can tell what I did wrong.
6. The feedback I have received on my labs has highlighted areas of weakness in my understanding.

Correlations Among Measures

	Distributive	Interactional	Procedural
Distributive	1	0.663**	0.492**
Interactional	0.663**	1	0.485**
Procedural	0.492**	0.485**	1