

Arguments for Plus/Minus Grading: A Case Study

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The issues of grading systems and policies continue to be a hotly debated topic in higher education. One central issue is whether faculty and students are better served by the adoption of a plus minus grading system. The present paper addresses the following four major reasons to use plus/minus grading: reduced grade inflation, better differentiation among students, increased student motivation, and enhanced image of grades and an undergraduate degree. Additionally, using grade data collected, the impact of plus minus qualifiers on student grade point averages (GPAs) was predicted in light of the major reasons. Ultimately, the faculty concluded that the adoption of plus minus grading would have a positive impact in each of these areas. It is expected that the summary and statistical analyses presented here will be of great benefit to anyone considering such a change.

Since the 1900s, the issues of grading systems and policies have been a topic of great debate in undergraduate higher education. One of the issues central to this debate is grade inflation. A 1992 study conducted by the American Association of College Registrar and Admissions Offices (AACRAO) has indicated that grade inflation continues to be a problem in higher education (cited in Riley, Checca, Singer, & Worthington, 1994). Because of grade inflation, researchers have suggested that it has become increasingly difficult to distinguish good and poor work in academe (e.g., Cole, 1993). In addition, many have suggested that grade inflation devalues the work of exceptional students and of an undergraduate degree, perhaps making it more difficult for students to gain admission to graduate and professional schools (Bolin, 1975; Davidson, 1975).

In response to the growing problem of grade inflation as well as the changing demands of students and faculty, many colleges and universities are reexamining their grading systems. In recent years there has been an increasing trend away from grading systems with fewer and fewer marking categories (e.g., pass/fail, A-F) and toward grading systems with a larger number of marking categories (Quann, 1987). Specifically, the 1992 AACRAO study indicates that there has been a 12 percent increase in the number of institutions adding plus (+) and minus (-) qualifiers to their traditional letter grade system. As a result, the number of institutions using the traditional letter grade system has dropped (cited in Riley et al., 1994).

Given the ongoing discussion of grade inflation and the increasing trend toward +/- grading in higher education, it is surprising to note the lack of recent *and* available literature addressing these issues together. In fact, much of the literature that exists on the topic is in the form of internal publications (e.g., Burnham, 1981; Farland & Cepeda, 1989; Gosselin, 1997). Furthermore, most of these publications have failed to adequately summarize the arguments pertaining to grade inflation, +/- grading, and other related issues. In addition, not a single article has discussed the process involved in moving from a traditional letter grade system toward +/- grading. In that light, it is believed that the present article will be a useful tool to colleges and universities who may be debating a similar change in their grading system.

As part of a yearlong effort to examine +/- grading and its potential impact on grade inflation, an ad-hoc committee was formed at Berry College, a four-year private liberal arts institution located in Rome, Georgia. The committee was composed of faculty, student representatives, and the college registrar. The main charge of the committee was to identify and evaluate the reasons for changing from a traditional letter grade system (i.e., A, B, C, D, F) to +/- grading and to make recommendations to the administration for or against the adoption of +/- grading. The four issues are as follows: (1) reduced grade inflation, (2) better differentiation among students, (3) increased student motivation, and (4) enhanced image of grades and an undergraduate degree. Each of these issues will be discussed in detail through the remainder of the manuscript. In addition, because of the lack of recent and available data, the committee collected data from a random sample of faculty and conducted their own statistical analyses in order to provide empirical support for each issue.

GRADE INFLATION

As mentioned in the Introduction, grade inflation continues to be a problem in undergraduate higher education. Grade inflation refers to the reduced validity in grades due to an overwhelmingly large distribution of As and Bs. Many researchers speculate that the problem of grade inflation in higher education may have its roots in the high schools (e.g., Goldman, 1985; Winsor, 1977). However, others have suggested that changes in student and faculty attitudes toward grading (Davidson, 1975; Hendrickson, 1976), the use of student evaluations in promotion and tenure decisions (Grieves, 1982), and the continued existence of traditional letter grade systems also contribute to the problem (Riley et al., 1994).

Jacobson (1978) noted that faculty are under great pressure to give borderline students the higher of the two letter grades. Take for example, six students, five of which lie on the A-B border. If five students are assigned As and the sixth student a B, the average GPA would be 3.83. But, if three of these students were given A-s and the remaining two B+s, then the average GPA would fall to 3.45, thus contributing less to grade inflation (see Jacobson, 1978, for a similar analysis). In fact, many studies have indicated that the use of +/- grading has played an important role in curtailing grade inflation. However, this statement is only valid when institutions do not include an A+ in their marking system (Quann, 1987).

Although several studies have reported a reduction in grade inflation using +/- grading, other institutions have reported that the use of + and - qualifiers have no effect on curbing the problem (e.g., Jacobson, 1978). Additionally, a drawback to relying on these earlier conclusions is that many of the same authors also claimed that as of 1980, the national epidemic of grade inflation was coming to an end (Quann, 1987). Because of this contradictory evidence, coupled with a continued and perhaps accelerated upward trend in grades, we conducted our own study based upon data presented in earlier publications and data collected from the faculty at Berry College.

Reports by Quann (1987) and Gosselin (1997) each summarized the distribution of letter grades assigned in all undergraduate courses both before and after the implementation of a +/- grading system. While both studies used this data to examine the effect +/- grading had on grade distribution, a major deficiency of their reports is that neither study used that data to measure the effect implementation of the +/- system had on grade inflation.

Table 1: GPAs calculated from Washington State data, 1970 – 1985

Year	+/- used	GPA
1970	no	2.81
1973	no	2.86
1976	no	2.80
1979	yes	2.77
1982	yes	2.75
1983	yes	2.72
1984	yes	2.71
1985	yes	2.72

In order to calculate GPAs, each traditional letter grade reported was converted to a 4.0 (i.e., A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.0).

For the letter grades with +s and -s, a .7 was added and .3 subtracted from each value, respectively (e.g., A- = 3.7, B+ = 3.3, B- = 2.7, C+ = 2.3, C- = 1.7, D+ = 1.3, and F=0.0). An overall GPA was then calculated for each year that grade distribution data was reported.

Quann (1987) reported data from Washington State University for the years 1970 - 1985. Before the implementation of +/- grading in 1979, the overall GPA increased on average by 0.02 or 0.7% each year (i.e., with the exception of 1976 where it actually increased by .06). More importantly, after the implementation of +/- grading, the overall GPA essentially *decreased* on average by 0.012 or 0.4% each (Table 1). While the actual decline in measured GPA is small; it is significant to note that the implementation of a +/- grading system reversed the trend towards a higher GPA every year. Interestingly in the first year of +/- grading, the overall drop in GPA was 0.026, a nearly 1% drop in GPA.

Similar analysis of the 1986 - 1997 data from North Carolina State University (Gosselin, 1997) showed that before +/- grading, the overall GPA increased on average 0.029 or 1% per year while after the implementation of +/- grading, the overall GPA increased on average only 0.01 or 0.3% per year (Table 2). While +/- grading did not eliminate the upward trend in grades at North Carolina State University, it is significant that the implementation of +/- grading produced a massive 2/3 reduction in the rate of grade inflation, certainly a profound impact. Similar to the Washington State University data, a significant 0.027 or 1% drop in overall GPA occurred in the first year +/- grading was in effect.

Table 2: GPAs Calculated from North Carolina State University, Fall Semesters 1986-1996

Year	+/- used	GPA
1986	no	2.55
1987	no	2.61
1988	no	2.63
1989	no	2.65
1990	no	2.69
1991	no	2.73
1992	no	2.77
1993	no	2.78
1994	yes	2.76
1995	yes	2.80
1996	yes	2.81

For comparison, the committee collected a random sample of numerical grades from the previous academic year (1998-1999) from varied disciplines across campus. Although Berry College uses a traditional A-F grade system for recording course grades, many faculty maintain numerical grades which are later converted to the standard A, B, C, D, or F scale. The use of raw numerical grades was necessary in order to predict the possible impact +/- grading could have on letter grade distribution and overall GPA.

Upon examination of the Berry College data we obtained, the committee found a 0.062 or 2.1% drop in the mean GPA across disciplines when a +/- grading scale was applied. This result correlates well with our earlier analyses suggesting that the adoption of a +/- grading scale would have a significant effect on grade inflation. Upon further examination of the individual means for each school within Berry College (i.e., Education & Psychology, Mathematical and Natural Sciences, Humanities and Social Sciences, and Business), it was found that there was a direct relationship between the amount of grade inflation in each school and the magnitude of the predicted reduction. Thus, schools with higher GPAs were associated with larger predicted reductions in overall GPAs while schools with lower average GPAs tended to have lower predicted reductions in their average GPAs.

Since the data we collected from the faculty did not include all grades assigned during the 1998 - 1999 academic year, one further analysis was performed. The committee took the official GPA that was reported by the registrar for the spring 1999 semester and applied the predicted change we calculated if a +/- grading system were adopted. This analyses suggested that the overall institutional GPA is predicted to drop by 0.15, a 4.7% reduction.

The results of these analyses are significant for several important reasons. First, they clearly demonstrate that the adoption of +/- grading is likely to aid in reversing or at least significantly reducing the rate of grade inflation. The finer distinctions available from the +/- grading scale allow a better representation of a student's level of performance reducing the likelihood that faculty will bump students up to the next grade level. Since the choice of a particular grading scale is not the sole contributing factor to the continued trend in grade inflation, a switch to +/- grading cannot be expected by itself to end grade inflation. It does, however, appear to have a significant impact on that issue.

Second, the results of our study demonstrated that students involved in majors that traditionally have lower GPAs would be less affected by

adoption of a +/- grading system. This latter point is especially important given that several students, especially in the sciences where lower average GPAs are frequent and admissions standards to medical, veterinary, dental, and graduate schools are rigorous, felt adoption of the +/- grading system would severely disadvantage them. Thus, while the average GPA of each school would decline, those with lower GPAs to begin with would experience a smaller drop, bringing down the average student GPA less than other schools within the college.

BETTER DIFFERENTIATION

Many faculty who are proponents of +/- grading assert that the addition of more grading categories would allow faculty to make finer distinctions among students. For example, in the traditional letter grade system, a student who has an 88 average would most likely receive the same grade as a student who has an 80 average (i.e., a B). This scenario presents a dilemma for many faculty who feel that a student receiving the 88 has performed far superior to the one receiving the 80. Ironically, it is this exact situation that often produces grade inflation as pressure mounts on faculty to reward harder working students.

Related to the issue of finer distinction among students is grouping error. Psychometricians have found that the traditional 5-letter grading scale allows too many errors due to measurement and grouping (e.g., Ebel, 1969; Singleton & Smith, 1978). Grouping error occurs when the width of a class interval is made too narrow or too broad. In general, researchers have found that the reliability of grades increases as the number of marking categories also increases, as in the case of adding +/- qualifiers (Singleton & Smith, 1978). Ebel (1969) reported that if data have a reliability of .95, reporting scores using 15 grading categories reduces reliability to .94, 10 categories to .92, 5 categories (e.g., A-F) to .85, and 2 categories (e.g., pass/fail) to .63. Given these findings, the committee concluded that there was a distinct advantage to adopting a grading system that had at least 10 categories (most +/- scales have 11 categories) since that increases the reliability of the assigned grades.

While many faculty relish the ability to make finer distinctions, discussions among our faculty demonstrate that several feel it is very difficult to distinguish between such fine levels of student performance. Indeed, Quann (1987) reported that especially in the social sciences where grading is much more holistic not only do faculty report difficulty differentiating between finer categories, but often feel any attempts to do so simply create less precision in student evaluations.

Once the committee had researched the benefits associated with a larger number of grade categories, it needed to decide the type of grade scale to recommend. Our own research of area colleges and universities revealed that there are predominately two forms of +/- grading scales used: (1) those which add .67 and subtract .33 and (2) those which add .70 and subtract .30 to the value of the whole-letter grades. The committee selected the latter of the two systems (i.e., +.70/-.30) for the following reasons. First, a 1997 California study indicates that most colleges and universities around the country that use +/- grading add .70 and subtract .30 from whole-letter grades (Curriculum Services Unit, 1997). Second, it was reasoned that since the +s and -s are seen as modifiers of the whole-letter grade there is no inherent benefit to having a grading scale that contained precisely even arithmetical intervals between the grades. Additionally, while a grading scale that added or subtracted 0.33 would create nearly equal divisions, going to the hundredths decimal place implies grading precision that is not generally possible (Curriculum Services Unit, 1997).

The inclusion of an A+ grade was also discussed. Many faculty feel that an 'A' by definition is superior and represents perfection on a 0-4.0 scale. Thus, many institutions do not include the A+ grade. While others may include the A+ grade on a transcript, they weight it the same as an 'A' fearful that weighting the A+ higher (e.g., 4.3 or 4.33) would only lead to an increase in grade inflation. However, for those students who are used to receiving mainly 'A' grades, the removal of an A+ grade poses a serious threat to their GPAs. While an A- can lower their GPA, an A+ will do nothing to raise it. In fact, the 1997 California study found that after +/- was implemented at California State University, the number of graduate students with 4.0 GPAs decreased sharply from 844 to 580 (Curriculum Services Unit, 1997). Another study indicated a 19% drop in GPA for graduate students and a 34% drop in GPAs for undergraduate students (Gosselin, 1997).

While our own statistical analyses of the data from Washington State University, North Carolina State University, and Berry College predict a similar sharp decrease in GPAs, it is more interesting to examine what happens within the 'A' category. Specifically, we found that the adoption of a +/- grading scale could result in a substantial number of students currently receiving 'As' falling to 'A-s'. The data from Washington State shows that in 1985, 33% of the students receiving 'As' received an A- compared to 18% at North Carolina State (fall 1996) and a predicted 67% at Berry College. While the figure calculated from the Berry College data

seems high in relation to the previous studies, a sample of faculty that had used +/- grading at other institutions reported that nearly 67% of the 'A grades' were 'A-s.' It is also noteworthy to mention that this 67% reduction appears to be equivalent across all disciplines within the college.

Additionally, when the committee discussed different grading scales with the students during an open forum at the Student Government Association, 80% of the students voted against including an A+ valued higher than 4.0. Many reasoned that inclusion of an A+ might lead to unhealthy competition among students. Thus, given the arguments presented, it was the committee's decision to exclude the A+ grade altogether from any possible grading scale considered by the faculty.

Finally, the committee also decided whether to include a D- grade in their proposed grade scale. Quann (1987) noted that the D grade represents 'considerably below average work, or barely passing...thus, standards should not be lowered by further categorizing scores below the barely passing level (p. 7).' Thus, it was the committee's decision to exclude the D- grade from their proposed grade scale.

In summary, the committee selected a +/- scale with weights of +.70 and -.30. In addition, the committee elected to exclude the A+ grade from the grade scale for fear of grade inflation. Similarly, a grade of D- was excluded from the grade scale.

MOTIVATIONAL FACTORS

An artifact of higher education today is perhaps the lamentable statement that few students attend college purely for educational edification. This is not to say that most students don't want to learn, but rather, for the majority their focus remains on the degree, which they view as a ticket to a high paying job, success, and future financial security. Clearly, grades are the major obstacle towards both attaining the desired degree and achieving the dream job. While this notion is not new, it probably explains why most students are concerned about their grades rather than whether they have learned, grown, and stretched their minds in the process. Grades, then, remain the sole means an educator has to both motivate and report on a student's abilities.

Research by Stallings and Leslie (1970) reported the attitudes of students regarding grading. Of particular note, they asked 3,400 students enrolled at the University of Illinois to respond to the statement 'Grades provide me with the motivation to do assigned course work.' Overall, nearly 70% of the respondents agreed with the statement. Additionally,

when the students were grouped by graduation class or discipline, each group maintained a similarly high level of affirmation.

While there are a few studies that examine the effects that different types of grading systems have on student motivation (e.g., Hugh, 1981; Williams, 1975; Eiszler, 1983) none examine the motivational effects of a +/- grading system. In a related study, Cullen (1975) examined the effect of adding points for completing an assignment (+2, +3, +4, etc.) or subtracting points for not completing the assignment (-2, -3, -4, etc.). Cullen found that when 233 high school students were offered points as an incentive to complete assignments, a larger number of the students completed the assignments, as one might expect. Additionally, as the level of the incentive was increased, the number of completed assignments also increased. It is surprising, however, that Cullen reported assignment completion was even greater when students were threatened with the loss of points, a negative incentive.

As the committee began to investigate and discuss the issue of student motivation, a clear example emerged which summarized the problems with the traditional, five category A - F system. Average Angie performed reasonably well in her classes. Although she wanted to do better she seemed to get an average C on most exams and assignments. Like most students, Angie is an adept bookkeeper and constantly calculates her class grade given the evaluation criteria in the syllabus. As the semester progresses, Angie realizes that given the assignments yet to be completed, it is mathematically impossible for her to raise her average enough to earn a 'B.' While disappointed, Angie also realizes that it is also nearly impossible for her average to drop low enough to earn a 'D.' Angie's conclusion is that she doesn't need to work any harder since her efforts are unlikely to result in a better grade. More importantly, Angie also realizes that she can also slack off without any serious implications to her grade.

Indeed, many faculty have experienced weaker student efforts towards the end of the semester. Since the traditional A - F system generally has 10 point spreads between letter grades, as the semester progresses, it becomes less likely students will be able to change their grades except in borderline cases. Once students perceive that their grade is less likely to be influenced by later performance, their motivation dwindles.

With the implementation of a +/- grading system, the spread between grades becomes smaller, and students are able to increase their grades through extra effort even at the end of the semester. Cullen's earlier

studies demonstrated that the addition of points to a grade was a strong incentive providing student motivation to complete assignments. By parallel, the addition of +/- qualifiers to the traditional A - F grading system should serve as an excellent motivator for students to continue strong efforts on all assignments and examinations right up to the last day of classes. Additionally, Cullen's research suggests that if the benefit of receiving a higher grade (i.e., a B+ compared to a B) is not a strong motivator, the fear of moving to a lower grade (i.e., a B- compared to a B) from lack of effort might be an even stronger motivator.

While not every student will be able to sustain the motivation to increase his or her grade late in the semester, the committee ultimately decided that the addition of +/- grading would provide an excellent motivating tool. Hard working students will have the opportunity to reap some reward for their extra efforts, while at the same time, other students will have the motivation to diligently apply themselves to their assignments throughout the semester.

ENHANCED IMAGE OF GRADES AND AN UNDERGRADUATE DEGREE

While students were nearly split on whether a +/- grading system should be implemented, surprisingly, most of the student opposition dissipated when students were given the option of having the new system apply only to future students. The committee discussed at length options for grandfathering current students with the college registrar. For example, one option was to offer them the choice of graduating under the old grading system. But it became apparent to the committee that given the limited resources of the college registrar, such a system would be a logistical nightmare. Since the academic policies listed in the official college catalogs are often seen as a contract with the students, the committee sought another way to satisfy the students on this issue. Ultimately, the committee decided to propose that implementation of a +/- grading system be delayed three years. In that time, all new students would be made aware of the impending change while the current students would all graduate before the change went into effect. When the +/- grading did begin, all students would then be covered by the new grading policy. This suggestion was well received by both the students and faculty.

Further discussion with students indicated that they felt the adoption of +/- grading was beneficial. While most of the student concerns have already been addressed, the students raised one further benefit the committee found to be interesting. Namely, students felt adoption of +/-

grading would increase the intrinsic value of an 'A' and help the very best students rise above the crowd while also increasing the value of their degree.

While not easily quantified, the notion that adoption of a +/- grading system would increase the value of a college degree is very realistic. Specifically, if it is more difficult for students to attain straight 'A' grades; for those few that do, the feat becomes more extraordinary. These students would then be easily recognized.

With the current traditional A - F grading system, anyone evaluating a transcript would not be able to know the true level of performance when comparing students. Consider, for example, two students in the same class, Lazy Suzy and Eager Ellen:

Lazy Suzy didn't really work very hard until the end of the semester when she realized she was in danger of earning a 'C'. With a little effort, her final average was an 81, which earned her a 'B.' On the other hand, Eager Ellen worked hard all semester but with an 89 average didn't quite make an 'A' earning the same 'B' grade as Lazy Suzy. After graduation, by chance Lazy Suzy and Eager Ellen both apply to the same company for a job. Since both students earned the same grade, it is possible that the evaluator will assume they both have the same level of understanding and performance.

While better differentiation has already been discussed, the student's point is that others evaluating their grades for employment or graduate admissions will have a much clearer understanding of each student's performance. This would give those students that perform at the higher end of any grade category an edge since others will perceive them as better students. Additionally, students that perform at the lower end of any grade scale like Lazy Suzy might be judged to have a higher level of performance/ability than is actually the case. If Lazy Suzy were hired over Eager Ellen, every student that earns a 'B' at Berry College would be assumed to be similar to Lazy Suzy. If Lazy Suzy is less than impressive, that can have a detrimental affect on future Berry College students. Since students are ultimately concerned with their opportunities once they graduate, this aspect of +/- grading was especially attractive to them. Since the best students would be clearly discernable with a +/- grading system, this was viewed as both an advantage and incentive for the students.

Conclusions

Upon implementation of +/- grading at Berry College, the committee intends to monitor the change in overall GPA in order to determine if the

actual effects obtained (reduction in rate of grade inflation, better differentiation of student performance, and student motivation) match those predicted in this study. On a final note, the committee strongly recommends that anyone considering such a change in their grading scale would be well advised to ensure that all interested parties (students, faculty, and administration) are part of the discussion from the very beginning.

Acknowledgments

The authors would like to thank Dr. Jacqueline McDowell for her encouragement, suggestions, and financial support of this work. In addition, we would like to thank Dr. Robert Frank, Lindsey Brown, Jamie Ferguson for their efforts on the committee which ultimately helped in the preparation of this manuscript. Finally, we would like to thank Ann Phillips for assisting with data collection and entering.

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