Pluses and Minuses of a Traditional Grading System

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Abstract – Since 1966 the Virginia Military Institute (VMI) has used a grading system with whole letter grades ranging from "A" to "F" with respective quality points ranging from four to zero. This traditional grading system does not use plus or minus grades. Many schools that once used a traditional grading system have switched to a system utilizing plus and/or minus grades. Typical reasons given for the adoption of plus/minus grade systems include: the ability to better differentiate student performance, the reduction of grade inflation, the incentive to motivate students to study for final exams, and the appearance of a more rigorous academic program. VMI has spent part of the past two years investigating whether or not to abandon its traditional grading system in favor of a plus/minus grading system. The process has discovered that both systems have benefits. Reasons for keeping a traditional grading system are presented in this paper.

Keywords: Grade Inflation, Traditional, Plus and Minus

WHY CONSIDER CHANGE?

The Virginia Military Institute (VMI) has been using the same traditional grading system since 1966. Prior to 1966, VMI used a ten point system as shown in Table 1 (information provided by the Registrar's office). The current system, sometimes referred to as a traditional lenient system, is straightforward with exactly five letter grades possible ("A" through "F") and five quality credit points associated with each grade ("4.0" to "0.0", respectively). Although the system has been called a lenient system by some, students at VMI, who are called cadets, would argue that there is nothing lenient about the grading system at VMI. In addition to taking required courses for their majors, all cadets are required to take ROTC courses, physical education courses, participate in some type of sport (either NCAA or club), and live under a strict military code that requires a significant amount of time for inspections and drills.

Recently, some faculty expressed concerns that the traditional system did not allow for adequate differentiation between cadets who perform at different levels. For example, a cadet who receives a final average of 89 in a course would receive the same final grade ("B") as a cadet that receives a final grade of 80. The concern was expressed and debated at length at several department heads' meetings. Some were ready to switch to a grading system that allowed for plus and minus grades while others wanted to keep the current system. Strong debates ensued, and all informal votes resulted in near fifty-fifty ties.

To help resolve the issue, the dean of the faculty appointed an ad hoc committee to investigate the issue. The formal charge was, per Memorandum Number 06 dated 13 August 2012, to:

"Identify the issues associated with using a plus/minus grading scale at VMI and investigate the issues sufficiently to allow an informed decision between either abandoning or adopting a change. It may be necessary to determine a grading scale that would be applicable to VMI as a first step."

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Table 1 – Historical Grading Systems at VMI

| July 1966 to Present | | | |
|----------------------|------------------|---------------|--|
| Α | 4 quality points | Outstanding | |
| В | 3 quality points | Good | |
| С | 2 quality points | Average | |
| D | 1 quality point | Below Average | |
| F | 0 quality points | Failure | |

| September 1957 to June 1966 | | | |
|-----------------------------|------------|---------------------|--|
| Α | 9.00-10.00 | Outstanding | |
| В | 8.00-8.99 | Good | |
| С | 7.00-7.99 | Average | |
| D | 6.00-6.99 | Below Average | |
| Е | 5.00-5.99 | Conditional Failure | |
| F | Below 5.00 | Failure | |

| September 1948 to September 1957 | | | |
|----------------------------------|------------|---------------------|--|
| Α | 8.6-10.00 | Outstanding | |
| В | 7.4-8.59 | Good | |
| С | 6.4-7.39 | Average | |
| D | 6.00-6.39 | Below Average | |
| Е | 5.50-5.99 | Conditional Failure | |
| F | Below 5.50 | Failure | |

| Prior to September 1948 | | | |
|-------------------------|------------|---------------------|--|
| Α | 8.80-10.00 | Outstanding | |
| В | 8.20-8.79 | Good | |
| С | 7.70-8.19 | Average | |
| D | 7.50-7.69 | Below Average | |
| E | 7.00-7.49 | Conditional Failure | |
| F | Below 7.00 | Failure | |

The committee, chaired by one of the authors of this paper, began to meet and discuss the issue. It became immediately clear that the faculty held strong views and that any decision would require care to be taken to assure that a change would not have any significantly negative consequences to cadets. Previous papers by Bressette [1] and Elikai [2] were used to help frame the discussions. The committee's work lead to a report submitted to the dean which was discussed at several levels. The faculty continued to hold strong opinions about both grading systems. Each time an informal vote was taken it resulted in a near fifty-fifty split. Fisticuffs never ensued, but they were close at times. To help find if any true consensus existed, a faculty forum was held and a short survey was given to the entire faculty.

GRADING SCALES AT PEER INSTITUTIONS

The committee had been told that many schools had already switched from a traditional grading system to a plus/minus grading system. To confirm this, the committee chose a peer group comprised of 21 colleges/institutions from VMI's 2004 State Council for Higher Education in Virginia (SCHEV) Peer Group, the military academies, and select institutions in the commonwealth of Virginia. Table 2 shows the results of this investigation.

Table 2 – Comparison of Grading Systems

| College/Institution | Current Grading System | Typ Plus/Minus | A+ | Notes | |
|-------------------------------------|------------------------|----------------|--------|--|--|
| Alfred University | Plus/Minus | 0.33 | No | No D- used | |
| Bucknell University | Plus/Minus | 0.33 | No | No D+ or D- is used | |
| Grove City College | Plus/Minus | 0.33 | Yes/No | A+ is used but is worth same as A (4.0) | |
| Lafayette College | Plus/Minus | 0.3 | No | | |
| Old Dominion Univeristy | Plus/Minus | 0.3 | No | | |
| Transylvania University | Plus/Minus | 0.33 | Yes/No | A+ is used but is worth same as A (4.0) | |
| Trine University | Plus/Minus | 0.5 | No | Uses plus scale only (no minus) | |
| Union College | Plus/Minus | 0.3 | No | No D+ or D- is used | |
| University of Evansville | Plus/Minus | 0.3 | No | No D- used | |
| University of Minnesota-Morris | Plus/Minus | 0.33 | No | No D- used | |
| University of Virginia | Plus/Minus | 0.3 | No | A+ is used in the Law School | |
| University of Wisconsin-Platteville | Plus/Minus | 0.3 | No | No D- used | |
| US Air Force Academy | Plus/Minus | 0.3 | No | No D+ or D- is used | |
| US Coast Guard Academy | Plus/Minus | 0.3 | Yes/No | An H for Honors, but still worth 4.0, No D+/D- | |
| US Merchant Marine Academy | Plus/Minus | 0.33 | No | No D- used | |
| US Military Academy | Plus/Minus | 0.33 | Yes | No D+ or D- is used | |
| Valpariaso University | Plus/Minus | 0.3 | No | | |
| Virginia Tech | Plus/Minus | 0.3 | No | | |
| James Madison University | Traditional | N/A | No | | |
| US Naval Academy | Traditional | N/A | No | | |
| Virginia Military Institute | Traditional | N/A | No | | |
| Wilkes | Other | 0.5 | No | Uses a 0.5 scale with no letters assigned | |

The second column is grouped by the type of grading system currently used (either Plus/Minus or Traditional). The third column shows the amount of the increase/decrease in the plus-minus system. The fourth column indicates whether or not the system includes an "A+". Of the 21 colleges/institutions, only James Madison and the US Naval Academy continue to use a traditional grading system similar to VMI. It was evident that many colleges/universities had adopted a plus/minus grading system. The numerical value of the plus or minus varied, but most used either 0.3 or 0.33. The fifth column indicates that some did not use the plus and/or minus for the "D" range of grades.

PROPOSED GRADING SCALE

After considering input from faculty, administration, the Registrar's office, and the athletic department, the ad hoc committee proposed that the consideration continue to be given to adopt a plus/minus grading scale. For preliminary discussions, the committee proposed the following grading scheme shown in Table 3. This was a somewhat compromise plus/minus system, with plus and minus grades for the A, B, and C ranges, but none for D and F. This type of system does have precedence, and the committee thought that a compromise may allow for both sides of the debate to reach an agreement. The proposed scheme utilized the same Quality Points scale that is currently used by VMI (0 to 4). It did not contain an "A+" nor did it contain plus or minus values for the "D" and "F" grades. However, once the proposed scale was presented, the faculty still seemed to be divided.

Table 3 – Proposed Grading Scheme

| Letter Grade | Quality Points | | | |
|--------------|-----------------------|--|--|--|
| Α | 4 | | | |
| A- | 3.7 | | | |
| B+ | 3.3 | | | |
| В | 3 | | | |
| B- | 2.7 | | | |
| C+ | 2.3 | | | |
| С | 2 | | | |
| C- | 1.7 | | | |
| D | 1 | | | |
| F | 0 | | | |

FACULTY SURVEY RESULTS

A faculty forum was held to allow faculty to voice their concerns and/or support for either system. The moderator of the forum asked that the discussions focus on the main question - should VMI adopt some type of plus/minus system? The forum was attended by about 20 percent of the faculty. A majority of those in attendance were adamantly opposed to adopting any type of plus/minus system. Most of those that spoke against the plus/minus system expressed concerns that switching could possibly have a significantly negative impact on athletes. The concern focused on whether or not athletes could maintain a "2.0" average if a system that included a C-minus that was worth less than "2.0" were adopted. From the forum, it appeared that a majority were opposed to adopting a plus/minus system.

Immediately following the forum, a survey using Survey MonkeyTM was sent to the entire faculty. The survey, shown in Figure 1, contained five questions. The faculty was given one week to complete the survey. Response, as a percentage of the faculty, was very high. Out of a listed 145 full-time faculty, 121 responded to the survey. [3] This is an impressive 83 percent response rate.

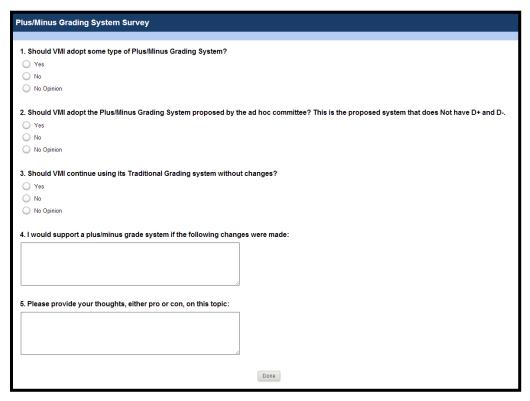


Figure 1 – Survey sent to VMI Faculty about Plus/Minus Grading System

Results of the survey, shown in Table 4, painted a different picture than the faculty forum. The faculty did seem to be nearly divided on the issue, although a slight majority did favor the adoption of some type of plus/minus grading system. For the first question of whether or not VMI should adopt some type of plus/minus system, exactly 50 percent responded affirmatively and 32 percent responded negatively. Seventeen percent responded no opinion. A smaller percentage, 34 percent, favored the proposed plus/minus scale. For question three, when the question was asked whether or not VMI should keep its traditional grading scale, 45 percent answered affirmatively. For the comment questions, questions 4 and 5, 56 left responses for question 4 and 78 left responses for question 5. A few of the responses were mean-spirited, but most were well-thought-out, carefully-considered.

Table 4 – Results of Plus/Minus Survey

| Question | Percent of Responders | | |
|---|-----------------------|-----|------------|
| | Yes | No | No Opinion |
| Should VMI adopt some type of Plus/Minus Grading System? | 50% | 32% | 17% |
| Should VMI adopt the Plus/Minus Grading System proposed by the ad hoc committee? This is the proposed system that does Not have D+ and D- | 34% | 46% | 20% |
| Should VMI continue using its Traditional Grading system without changes? | 34% | 45% | 21% |

PRIMARY ISSUES DISCUSSED DURING THE PROCESS

Based on the committee's work, several department heads' meeting, the faculty forum, and the survey, it became clear that the faculty perceived benefits and downsides to both grading systems. Some arguments outweighed others, but in the end, both systems were perceived to have strengths and weaknesses. Many of the arguments centered on the same reasons given in Bressette's paper that provides reasons to support a plus/minus system. [1] However, a few were specific to the unique environment offered at VMI. The primary issues are summarized by giving the argument from the plus/minus grading scale point of view first followed by the counter argument from the traditional grading scale point of view.

Differentiate Cadet Performance

The need to better differentiate cadet performance was one of the primary reasons faculty favored adoption of a plus/minus grading scale. Under the current traditional grading system, a cadet that receives an 80 would earn a "B", the same letter grade and number of quality points (3.0) that a cadet who receives and 89. By increasing the number of steps in the plus/minus grading system, many on the faculty believe that they could more accurately represent a cadet's performance in a specific course.

Those favoring the traditional system countered this argument with the fact that at the end of their cadetship (at the time of graduation), the final grade point averages under the two systems would be nearly the same, usually only different by an estimated 0.05 cumulative grade point average. The 0.05 difference was arrived by applying the different grading schemes to several sets of grades provided by the math and physical education departments. The number was also confirmed by previous work done by Bressette. [1] Although you could possibly differentiate better in a given course, the bottom line, overall grade point average, was not expected to change much between the two systems. It was also argued that many employers were only worried about the bottom line, or final grade point average, not the performance in individual classes.

Using statistics to consider what would happen to the overall grade point average with two different grading schemes elicited a considerable amount of warnings about the proper use of statistics. Applying the proposed plusminus scale to a collection of 174 grades supplied by the PE department indicated that the overall grade point average decreased by approximately 0.05. Reviewing the grades supplied revealed that there were a disproportionate number of grades that end in zero, either 90 or 80 or 70. This indicates that the instructor(s) most likely rounded up, and the cadets benefited from the traditional system. Under the plus/minus system, this benefit was not as pronounced, resulting in a slightly lower grade point average.

Some argued that no statistics should be created at all since faculty would alter their grading under any given system. Therefore, if grades assigned under one system are considered under a different system, the results would be biased. This is a valid argument. Therefore, although some of the committee members would have loved to present pages of graphs and statistics, a valid comparison is not possible unless the switch is made. The best that could be done was to consider what happened at other colleges/universities that made the switch. [1],[2]

Reducing Grade Inflation

A second reason to consider adoption of a plus/minus system was the fact that having more options in assigning grades can keep faculty from having to "curve up" grades, whether intentionally or unintentionally. Simply due to human nature, many 89's become an "A" in a traditional system. Human nature thinks "this is only rounding a single point up, what could be the harm". However, a person would almost never round a 90 down to an 89 and call it a "B" instead of an "A". Mathematically, a point is a point, and rounding up should be countered with rounding down. But this just does not occur. This tendency to round up instead of down is one of the main contributors to grade inflation. [2] Most likely, adoption of a plus/minus grading system would: (1) cause grade point averages to lower slightly and/or (2) keep grade point averages from rising.

The committee did not have data available for individual cadet grades throughout their cadetship to determine how an individual cadet's GPA would change if a plus/minus grade system were adopted. Since numeric grades are not currently submitted to the Registrar's office, this data was not readily available. The best the committee could do was to look at grades provided by individual instructors for multiple course sections. Although this does provide some useful information, it should be noted that the results are biased in the sense that they show grades from an individual professor instead of for an individual cadet.

Those favoring the traditional grading system argued that the overall "toughness" of the VMI experience counteracted any slight increase in final grades due to rounding up. Many argued that the need for cadets to manage their time required cadets to often not spend as much time as students at other colleges on a given subject. Therefore, cadets are often going into a final exam with a lower grade then they would if they were at a different college. An occasional rounding a grade up would not cause that grade to be unusually high. Instead, it could cause that grade to more accurately represent the performance.

Perception of a More Rigorous System

A third reason that many favored adoption of a plus/minus grading system was that plus/minus systems are often perceived as more rigorous systems. As such, many colleges that use to use a traditional grading system have converted to a plus-minus system. Table 2 does show that a majority of VMI's peer colleges/institutions are using a plus/minus grading system.

There were two primary counter arguments to the perception of a more rigorous system. First, many felt that the question was mute. Many at VMI (approximately half or more any given year) receive a commission into one of the armed services and enter full-time military service following graduation. For these cadets, there is no need for the academics to appear more rigorous as long as the academics are considered acceptable by the armed services. Second, some argued that the additional military training, required participation in a sport, and other commandant requirements make VMI rigorous enough. Therefore, there is no need to adopt a rigorous grading system.

Motivation

A fourth reason given for the adoption of a plus-minus grading scale was that a plus/minus system allows for the potential for rewards (plusses) or penalties (minuses) that could potentially motivate cadets. [2] For example, cadets may be more inclined to study for a final exam if they know that their grade may go either up or down. Using the traditional grading system, a cadet that has an 85 average prior to taking a final exam worth 30% has to make a 100 on the final exam in order to increase their final grade to an "A" (0.7*85 + 0.3*100 = 89.5) rounded up to an "A"). Likewise, the same cadet that has an 85 average prior to taking the final exam worth 30% can make as low as a 66.7 on the final exam to keep their "B" (0.7*85 + 0.3*66.7) rounded up to a "B"). Faced with the unlikelihood of getting a 100 on the final exam, and the ease of getting a 66.7 without studying much, cadets are often not motivated to study for a final exam under the current system. However, under the proposed plus/minus system, a cadet that has an 85 prior to taking a final exam worth 30% can increase their final grade to a B+ by earning a 90 on the final exam (0.7*85 + 0.3*90 = 86.5) rounded to 87 which is a B+). A cadet may be more motivated to study if he or she knows that earning a 90 on the final will increase their Quality Points by 0.3 for each credit hour.

The counter argument for how the traditional system provides for motivation was probably the most argued about issue. Some argued that cadets, by nature, will give 100 percent on a final exam even if they know that their grade may not change. Others argued that cadets, because of their need to manage time, are selective in what they study, and if they elect not to study for a final exam then that is their prerogative. It should be noted that much of the

discussion involved final exams because VMI requires all courses to have a cumulative final exam that is worth at least 30 percent of the final grade.

Athletics and the "2.0 and Go" Cadet

Many favored adopting a plus/minus system even though there were concerns about how it would affect cadets that were NCAA athletes. The most compelling argument for why adopting the system would not significantly hurt NCAA athletes was that many other colleges and universities have made the switch and found a way to make athletics work after the switch. The committee and faculty could not find situations where colleges or universities that had switched regretted the change.

The committee did believe that the adoption of a more rigorous system could most likely have the biggest effect on NCAA eligibility requirements since NCAA requirements are, at times, stricter than VMI requirements. Cadets entering their 3rd semester must have a minimum GPA of 1.80 per the NCAA requirements while they must only have a minimum GPA of 1.5 per VMI requirements. The requirements become about the same halfway through the academic program. NCAA athletes are provided additional academic support to help them meet the more rigorous NCAA requirements. Unfortunately, many erroneously spoke of "2.0 and Go" cadets in the same sentence as athletes. This stereotyping should not occur but it does. This was unfair to many athletes who do well academically. But, there clearly are some athletes that only want to maintain a 2.0 average, participate in sports, and "Go" at graduation.

Some argued in support of the current traditional system by advocating for the "2.0 and Go" cadets. VMI requires a 2.0 grade point average at the time of graduation both for in-major courses and overall. The argument states that if a cadet can maintain VMI's standards, then that is enough. It is true that adoption of a plus/minus grading scale could hurt a cadet that is consistently on the bottom of the "C" range. However, it is equally possible that the adoption of a plus/minus grading scale could help a cadet that is consistently at the top of a grade range. The committee discussed the option of eliminating the "C-" to help the "2.0 and Go" cadets. However, there is no precedent for a plus/minus scale without a "C-" and eliminating it would dilute the plus/minus scale to a point where its viability becomes questionable.

The Sinatra Syndrome - "My Way"

Many that were asked about why they preferred one grading scale over another stated that they preferred the system that they had during their undergraduate studies. Most that received their bachelor's degree at an institution with a plus/minus scale favored using the plus/minus scale over a traditional scale. Likewise, most that received their bachelor's degree at institutions with a traditional grading scale preferred the traditional grading scale. In other words, there was a tendency to like it "My Way"- the way a given person had experienced.

VMI Policies and Registrar Implementation

One issue that everyone agreed on was the fact that if a change were made, it should be made on a permanent basis. Adopting a plus-minus system on a trial basis was not recommended because of the confusion it would cause interpreting future transcripts. Also, a hybrid system (some faculty using one system while other faculty using a different system) was not recommended.

Other concerns that would need to be addressed were broken into two categories, VMI Policies and Registrar Implementation. VMI Policy concerns include policies such as departmental minimum "C" requirements. It would have to be determined if this would change to a minimum "C-" or remain as a minimum "C". The requirements for academic stars, dean's list, graduation with honors, and academic probation, etc. would all have to be revisited.

Registrar Implementation issues include how the plus/minus system would be adopted. A lead time would be required for the Registrar's office to make sure the programming could be done before adoption occurred. It would also have to be decided if the adoption would be phased-in or happen all at once. Policy concerning transfer credits and grades would have to be revisited.

BENEFITS OF THE PROCESS

VMI has not made its final decision whether or not to adopt a plus/minus grading scale. Regardless of the final decision, the authors believe the process of studying both systems has benefited the faculty in several ways. First, most were surprised how few peer colleges/universities were still using a traditional grading system. VMI's grading

scheme is in a minority position. Some felt that being outside the norm pointed to the fact that VMI should change in order to keep up with its peers. Others considered the same statistic and concluded that it supported the fact that VMI is a unique college and should stay that way.

A second benefit was the ultimate realization by the faculty that, at times, statistics cannot be used to make a decision. Since VMI has never used a plus/minus system, so there are no grades issued to cadets under a plus/minus system. Therefore, it is impossible to produce statistics to prove whether grades would increase or decrease if a change were made. Many faculty members initially felt that they would never switch unless it could be numerically proven that the change would not decrease overall grade point averages. By the end of the process, most realized that it would require a leap of faith, or a decision based on principles instead of numbers, and that the faculty would most likely make adjustments to allow for the new system to work at VMI.

A third benefit was that the process allowed the faculty to feel engaged in the decision making process. Speaking with faculty following the forum and survey, and reading the survey comments, revealed that most of the faculty will adjust to the new system if adopted, or continue with the current system as it is, without a major disruption to their teaching process. But, knowing that they were involved in the process will help make the transition easier.

Lastly, the process has generated good information that can be used in the future to help with this, and similar issues, when they arise. If the armed services ever begin to favor a plus/minus system over a traditional system, then VMI will almost certainly reconsider this issue in the future. This process has produced a good foundation for that future decision.

CONCLUSION

The process of studying whether or not to adopt a plus/minus grading scale at VMI has revealed that, although most colleges/universities are moving toward abandoning traditional grading scales, a traditional grading scale still has some plusses over a plus/minus grading scale. The issue is complicated at VMI because all cadets are required to participate in areas other than academics. Regardless of the decision that will ultimately be made, it has been useful to involve the faculty in the decision making process. The faculty involvement has allowed for new ideas and new ways to consider older ideas. It has also prepared the faculty for the change if it occurs.

REFERENCES

- [1] Bressette, A. Arguments for Plus/Minus Grading: A Case Study. Educational Research Quaterly, Vol. 25.3, 2002, pp. 29-41.
- [2] Elikai, F., & Schuhmann, P. W. An Examination of the Impact of Grading Policies on Students' Achievement. Issues in Accounting Education, Vol. 25.4, 2010, pp. 677-693.
- [3] VMI website, Quick Facts, http://www.vmi.edu/Content.aspx?id=10737420849.

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