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Analysis of Undergraduate Grade Trends at Brigham Young University Across a 20-Year Period

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Across a 20-Year Period

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A dissertation submitted to the faculty of
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Doctor of Philosophy

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ABSTRACT

Analysis of Undergraduate Grade Trends at Brigham Young University
Across a 20-Year Period

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Grades awarded to undergraduate students at Brigham Young University over a 20-year period were analyzed to determine to what extent the mean GPA may have increased. Study variables included enrolled freshman mean ACT, enrolled freshman mean AP credits, faculty research productivity, student evaluations of teaching (SET), and a university policy change regarding course withdrawal dates and calculating students' mean GPA. Other study variables included the overall grading philosophy of the college or school (normative, mastery, or other) and the course level (upper division, lower division). The study employed a regression model with splines for the residual, or yearly trend.

Upper division courses have higher mean GPA than lower division courses, and mean GPA in mastery-based grading colleges are higher than in normative-based grading colleges. Mean GPA in upper division courses are consistently higher than mean GPA of lower courses, regardless of college grouping, but the difference between the upper and lower division mean GPA scores of the normative-grading classification is significantly larger than the difference between upper and lower division mean GPA of the other two grading classifications. Faculty research productivity had no impact on mean GPA. SET scores are highly correlated with college grading philosophy and course level and did not further predict mean GPA. The university policy change had no statistically significant effect on most mean GPA, but there is a marginally significant negative local effect on mean GPA of the lower division normative courses, as well as a marginally significant positive effect on mean GPA of lower division mastery courses.

Grade trends vary between colleges with differing grading philosophies. They also likely vary across departments within colleges and from course to course within departments. Trends also differ between course level. Except for the non-significant effect of the policy change, mean GPA trends across most categories at the university have leveled off for more than a decade and are likely to remain so. Study results indicate there is no reason for alarm and that no systemic, rampant pattern of grade inflation is evident.

Keywords: grade inflation, grade increase, trend analysis

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CHAPTER 1: INTRODUCTION

Hand-wringing and angst about average grades in higher education is not a modern issue. The controversy goes back farther than most people realize. In 1894, a committee at Harvard University complained that "Grades A and B are sometimes given too readily — Grade A for work of no very high merit, and Grade B for work not far above mediocrity" (Report of the Committee on Raising the Standard, 1894, as cited in Kohn, 2008, p. 1). Recognizing the longevity of the issue, commonly referred to as *grade inflation*, can help frame the debate currently taking place in academic journals and in the popular press, where researchers dispute and point fingers over its causes, its solutions, and — perhaps surprisingly — whether or not grade inflation even exists. The factors that may have caused grades to be higher than expected in the 1890s are not necessarily the same factors to which current researchers are attributing the modern increase in average grades. Historical factors blamed for causing grade inflation range from the Vietnam War to Affirmative Action to popular psychology and concerns about students' self-esteem. While some of these factors may have influenced average grades at some institutions at a particular point in the past, it seems unlikely that the effect these events may have had would be pervasive through all institutions and persist across decades.

Reports in the media and academic journals over the last two decades have presented data that indicate the number of As and Bs given to college students is increasing in relation to the number of lower grades given (Levine & Cureton, 1998; Rojstaczer & Healy, 2012). Additionally, research has shown evidence that college GPAs of recent students are higher than college GPAs of previous generations and that GPAs continue to increase each year at a steady rate (Kuh & Hu, 1999; Rojstaczer & Healy, 2012). Nationwide, SAT scores have remained

relatively stable during the same period of time (College Board, 2013). Critics argue that rising GPAs and stable SAT scores are evidence of a nationwide crisis regarding inflated grades.

Research has contradicted this claim that there is a nationwide crisis regarding grades (Adelman, 2008; Pattison, Grodsky, & Muller, 2013). "Most of the increase in college grades appears to be the result of factors other than grade inflation. In fact, no systematic evidence supports the assertion that grade inflation is widespread" (Hu, 2005, p. 42).

'Inflation' is a term used to describe an economic condition in which products or services increase in cost, while the quality or type of product remains the same. Grade inflation has become the term used to describe student grades that increase over time without a corresponding increase in quality or achievement on the part of the student during that same time period — although it should be noted that in addition to the debate over the existence of grade inflation, there is also discussion surrounding its very definition (Hu, 2005; Kamber, 2008; Ku & Hu, 1999; McSpirit, Jones, & Chapman, 2000). Inflation is a word with negative connotations, and its use in the context of grades implies that the high grades given to current students are not earned or are not based upon the same criteria that grades were based on in previous decades. To counter this negative connotation, some researchers have proposed the phrase *grade increase* or *grade improvement* as a more accurate term for the phenomenon of rising grades (Hu, 2005; Kamber, 2008; Mostrum & Blumberg, 2012). Kohn (2008) points out that one should not automatically assume that a high grade is inappropriate simply because it is high.

Grades are one of the most visible and influential currencies in higher education. They are one of the ways in which higher education is evaluated. Students are not the only stakeholders whose worth and success are measured by grades; faculty and institutions are also measured and compared using those same grades. There is great diversity among colleges and

universities. It is widely understood that an A at one institution is not necessarily the same as an A at another institution. Also, a C in a particular course does not always represent the same level of achievement as a C in a different course, even if it is taught at the same college or even the same department. An attempt to clarify these disparities is not within the scope of this study, and perhaps nothing can or should be done to implement a nationwide, systematic standard that would prescribe a unified grading methodology. Higher education is a free market to some extent, one in which the professor is trusted as an expert in his or her field and it is up to the professor to decide how well the student has mastered the content. Students have the opportunity to choose between classes, professors, majors, and even institutions. Institutions evaluate their faculty and tenure those who are successful according to the values and principles of the institution.

Grades at BYU

Brigham Young University (BYU) is sponsored by The Church of Jesus Christ of Latter-day Saints and is the one of the largest private universities in the United States. It is part of a larger Church Education System (CES) that includes BYU satellite campuses in Jerusalem and Salt Lake City, sister universities in Idaho and Hawaii, and a business college in Utah. With ten colleges, BYU offers degrees in more than 180 academic programs, master's degrees in more than 60 programs, and doctorates in 25 programs. More than 1,600 full-time faculty and 500 adjunct faculty instruct over 30,000 students in over 7,000 classes each semester.

Factors Influencing Grades

Grades are awarded to students by the instructor as a measure of the students' success in demonstrating that they have learned, understood, and can apply the knowledge acquired in the course. By its nature, a grade is a judgment call by the professor. The grade a student receives is,

theoretically, evidence of their learning. In addition to the personal judgment of the instructor and the level of student performance and achievement, other factors influence grades, whether the professor (or student) realizes this or not. These factors likely impact grades differently across students, courses, departments, and institutions. Some factors impact grades in individual courses, while others influence total grade point average (GPA). In this paper, mean semester GPA and mean semester course grades will be used interchangeably, unless noted.

Faculty influences. Faculty bear the main responsibility for teaching students in higher education. Faculty choose the content, the course organization, the method of instruction, and the method of assessment used in their courses. Generally, faculty want their students to learn the material and perform well on assessments. However, there is a philosophical conflict because faculty are both advocates for students and judges of student performance. On one hand, it is their role to make a final ruling on how well the student has achieved the goals of learning the course material, but they have also just spent a semester as an advocate for and mentor to that student, helping him or her to remember and understand the course content. This contradictory role is not a comfortable position for many educators and can make them vulnerable to subtle external influences on their grading practices.

Departmental grading policies and influences. For many faculty, there is pressure — spoken or implied — from peers and administrators to maintain a normal distribution for the grades awarded in their classes. Mean grades can vary across departments, depending on the type of discipline.

Some subjects lend themselves to objective assessment measures, such as math, chemistry, physics, and economics. These disciplines appear to be less affected by individual faculty grading tendencies or pressure from students because the grade awarded is not dependent

on the personal judgment of the instructor. Some departments have predetermined ideal mean scores for the grades in their courses and adjust their exam questions to facilitate a normal bell curve distribution for grades, with only top performers being awarded high grades. Nationwide, grades in courses taught in these fields tend to fit a normal distribution, and mean grades are among the lowest of all subjects (Grove & Wasserman, 2004; Jewell, McPherson, & Tieslau, 2013; Johnson, 2003; Sabot & Wakeman-Linn, 1991). Of interest, however, are recent reports that even these objectively graded courses can experience grade inflation (Lowe, Borstorff, & Landry III, 2008; McAllister, 2008).

Grading in subjects such as English, philosophy, nursing, education, and political science is more subjective by nature and is more vulnerable to outside influences on the instructor's judgment. Grade distributions in these courses tend to be negatively skewed and have lower standard deviations.

Another influence on course grade distributions is the grading philosophy of the department or content area. Some disciplines use a mastery-based or criterion-referenced approach to grading. A mastery-based course is one in which the students are mentored and assistance is given to each student until they reach a determined level of achievement. Students are given multiple chances to master one level before moving ahead to a more advanced level. Students in the same course may be at different achievement levels during the semester, but all have the opportunity for a high grade. Brighouse (2008) argues that the average grades awarded by quantitative disciplines should not be compared to the average grades awarded by qualitative disciplines.

Department policies can impact the mean GPAs of students. One direct impact on student GPA is the requirement in some departments that all courses taken for that major must be

completed with a C or higher grade. Some majors will not accept credit for a course that a student passes with a D. By not accepting a D grade, the GPA mean will increase because students who may normally have earned a D grade will work harder to acquire the C- or will not be allowed to major in that field. Faculty may also feel pressure to raise D+ grades up a half-grade to allow the course to be counted.

Student evaluation of teaching (SET). Research shows that there are correlations between scores on student evaluations of faculty and the expected grades of the students in the course they are teaching. Generally, higher SET scores correlate to higher average grades for the course. Whether there is a causal relationship or other variables are also in play, the evidence of a relationship of some kind appears to be conclusive (Eiszler, 2002; Ellis, Burke, Lomire, & McCormack, 2003; Griffin, 2004; Johnson, 2003; McPherson, 2006; McSpirit, Jones, & Chapman, 2000; Sonner, 2000).

Course characteristics. Research shows that there is a negative correlation between the size of the course and the average grade of the course (Jewell & McPherson, 2012; Sonner, 2000). Likewise, there is also a negative correlation between the number of lower-level students (e.g., freshmen and sophomore) in a course and the average course grade: Courses that have a higher percentage of upperclassmen (e.g., juniors and seniors) have higher average grades (Creech & Sweeder, 2012; Jewell, McPherson, & Tieslau, 2013). Service courses at BYU are generally 100-level, large introductory courses taught by a department for students who are usually not majoring in that content area. For example, Chem 105 is a beginning chemistry course that fulfills a General Education requirement for non-chemistry majors. Major courses are generally 300- or 400-level courses with smaller class sizes and more upperclassmen (although there are some lower division courses for majors, most of the major courses are upper division).

When calculating average grades on a departmental level, both the service courses and major courses that the department teaches are included in the overall average grade for the department. These two types of courses are different enough that they could be analyzed separately when grade trends are being investigated. The lower grade averages of the service courses could be hiding grade increases in the upper level major courses.

Student influences. Because the demographics of the students being studied are important, factors based on student influences should be included in the study. Over the past 20 years, the student body at BYU has changed across various metrics, and many of these differences can affect today's grade trends.

Qualifications of admitted students. Applicants to BYU are more prepared for higher education than ever before. Many students have taken a preparation course, practice exams, and even retaken the ACT or SAT multiple times to achieve their highest score possible (E. Meyers, personal communication, June, 2014). Some schools are incorporating ACT/SAT prep courses into their traditional curricula.

The number of Advanced Placement (AP) credit hours BYU freshman have taken has increased over the last 20 years. Freshmen in 2013 came to their first day of college with an average of 20.4 AP credits under their belt, up from 14.9 in 1995. AP courses are generally more challenging than regular high school courses and better prepare students for the rigor of higher education. Additionally, sometimes, AP credit is counted toward higher education course requirements. High school students who intend to go to college are counseled to take these courses to improve their chances of being accepted at a selective university.

Student achievement and performance. It is assumed that the most prominent factor influencing student grades is the performance of the student on assessments given by the

instructor. Student performance in itself is multi-faceted because individual students will perform differently on different types of assessments in different contexts. Students are also unique in their learning styles, and if a course is predominantly lecture-based, those students who are efficient at audial learning will succeed. Those who would learn better by reading the text or experiencing the content in an interactive way likely will not fare as well.

Student motivation. Not all students come to higher education with the same level of motivation. Raw intelligence is certainly crucial, but even extremely brilliant individuals can fail to earn high grades if they cannot discipline themselves to work hard or are not interested in the task of learning. On the other hand, students with high motivation have the potential to perform better than their ACT scores predicted if they are determined to succeed.

Student choice. One factor closely tied to student motivation is choice. Students choose which school to apply for, what field they want to major in, and what courses they want to take. Students generally choose majors in which they do well. If they perform poorly in a class, they often do not persist in taking courses within that discipline (Creech & Sweeder, 2012; Sabot & Wakeman-Linn, 1991). Savvy students will also take courses with a lighter workload in semesters in which they are taking courses they expect to be more difficult or time-consuming (Grove & Wasserman, 2004). However, Rojstaczer and Healy (2012) provide evidence that students are not flocking to majors that are considered easy.

Parental influences. Anecdotal reports across campus offices indicate that the volume of contact between parents and students is increasing. Today's BYU students are more likely than those in the past to have parents with at least some college experience (E. Meyers, personal communication, June, 2014). College-educated parents tend to make more money, live in better school districts, and be savvier in preparing their children for higher education (Jones & Jackson,

1990; Wise, 1975). Alumni understand the system of higher education and can better advise their children on what courses to take, what majors to enroll in, and how to navigate college life in general.

Institutional influences. University policies and practices can impact grades directly and indirectly, but these policies and practices are often overlooked when researchers are investigating grade increase causes.

Enrollment cap. As has been discussed, the qualifications of BYU's admitted students are increasing each year. A key factor impacting these qualifications is the cap on the number of enrolled students set by BYU's Board of Trustees. Historically, this cap was a straight head count of full-time students and was increased over the years as resources were made available to accommodate increasing demand. In 2008, the calculation for the cap was standardized across all CES schools using a full-time equivalent (FTE) student as the unit of measure. To calculate total student FTE, the total number of credit hours taken by enrolled day students during the fall semester is divided by 15, which is the number set by the Board as an FTE. The current enrollment cap is set at 30,500 FTE students.

As the applicant pool grows larger, the number of highly qualified students increases proportionally. However, the number of students BYU can admit each year does not change with increasing demand, so more students each year are denied admissions, and the percentage of highly qualified students that are admitted increases. The result is that as demand increases, the ACT scores, high school GPAs, and other qualifications of admitted applicants also increase.

Increasing numbers of applicants. BYU is sponsored by The Church of Jesus Christ of Latter-day Saints (LDS Church). Many LDS Church members hope to attend BYU, where they can earn a higher education degree in an atmosphere that supports their values because 98% of

BYU students are members of the LDS Church. With a total Church membership of over 15 million, the interest in attending BYU is high. Currently, there are 402,871 living BYU alumni. Most of these alumni would like their children and grandchildren to attend their alma mater.

BYU also has one of the highest *claim rates* for universities in the nation. The claim rate is the percentage of applicants who accept an offer of admission. For the past decade, BYU has had a claim rate of around 79%. In other words, out of every ten students who are offered admission to BYU, eight students will accept and enroll in classes. This high claim rate is evidence that BYU is the top choice for the majority of its applicants.

Academic Standards Policy. Students at BYU must maintain a minimum cumulative GPA of 2.0 at all times. Students who have below a 2.5 GPA for a semester are flagged. They are contacted and encouraged by academic counselors to seek remedial help. Any semester in which a student's GPA falls below a 2.0 earns the student the WARN (warning) status, and their future registration for classes is blocked. A student then must meet with an advisor or faculty mentor, complete an academic success plan, and continue to earn semester GPAs above 2.0 in order to register for classes. If the student is able to raise their next semester's GPA above a 2.0, they return to GOOD status and are able to register as any other day student. However, if the student continues to perform below a 2.0 GPA the subsequent semester, they are moved to PROB (probation) status. The registration block continues, and the student must again meet with a faculty mentor or advisor and revisit his or her academic plan. Any future semesters with a GPA above a 2.0 are named PREV (previous), and the student can register without restrictions. However, the PREV status means that if a semester GPA drops below a 2.0 at any point, the student is immediately assigned PROB status, skipping the WARN semester. If a student has received PROB status and continues to have a semester GPA below 2.0, they are then suspended

and their status is SUSP. A suspended student is asked to step away from the university for at least one year and apply for readmission after that year has passed. In brief, three strikes and you are out. BYU dismisses approximately 250 students each year due to this policy, or less than 1% of the student body.

At BYU, a GPA of 2.0 represents a grade of C, which is mathematically considered to be the average. It should come as no surprise that the average GPA at BYU is above 2.0 because the university does not allow students who continue to perform below average to stay at BYU. Most students who find themselves close to the lower limit work hard to improve their grades so they can continue their schooling at BYU. However, in essence, BYU is much like Lake Woebegon, where all of the continuing students are above average because students with a GPA less than 2.0 are systematically excluded. Because the number of students who apply for admission far exceeds the enrollment cap, it is understandable that the university would want only students who perform adequately to continue. Nevertheless, the policy of dismissing students who have a GPA less than a C average must then be considered when faculty or administrators discuss the reasons the average GPA seems high.

As stated before, faculty in some courses feel pressure to maintain a specific distribution and have been heard to tell students that, since the average grade on the test was higher than expected, the next test will need to be to rewritten to bring the class average down. Considered in the light of the Academic Standards Policy and taken to the extreme, half of the students every class could be potentially be dismissed from the university each semester. Without the influx of new freshmen students each year and ignoring the likely possibility that a student could improve a below-average grade in one class with a higher grade in another, BYU would end up eliminating their entire current student body, except one student, within half a decade. A simple

illustration of this is a class of 24 students. According to the definition of average, approximately 12 students will perform below average and be dismissed. Then, with 12 remaining students, another class is taken. Half of those students will perform below average, so the total remaining is six, then three, and then one or two. This is an extreme example, but it illustrates the point that demanding a normal distribution of grades in all classes is not very sustainable for a university over time.

Change in Withdrawal Policy. Due to a change in policy that began in the fall semester of 2011, students at BYU can withdraw from a course up until the tenth week of a semester, at which time a W (withdrawal) will be placed on their transcript, regardless of the grade the student earned up to that point. A grade of W indicates that the student did not complete the course they registered for, but it is not counted as a grade or credits and has no impact on GPA. Prior to this change in policy, students had only five weeks to withdraw from a course without penalty. Lengthening the time allowed for a no-penalty withdrawal could theoretically raise the university GPA average because students who are failing or performing below average are more likely to withdraw from a course than a student who has above-average grades at the time of withdrawal.

Change in the policy regarding grades in repeated courses. Another university policy change that can impact BYU grades is the change in policy regarding counting grades in repeated courses. Prior to the fall 2011 semester, students could repeat a course, and the subsequent grade for that same course would replace the initial grade in the BYU GPA calculation. For example, if a student took Math 112 and earned a D, they could retake Math 112 a later semester, earn a C or higher, and the D would no longer be included in BYU GPA calculations. As of fall 2011, all course grades are counted and BYU GPA calculations include

all courses — regardless of whether or not the course has been taken previously. This policy change was implemented to comply with federal guidelines regarding federal financial aid to students. This change in the calculation of GPA has the theoretical effect of lowering university GPA averages because the lower grade is no longer replaced by a subsequent score in the adjusted BYU GPA calculation.

Previous Study of Grade Trends at BYU

Twenty years ago, Dr. Danny Olsen studied grade inflation and deflation at BYU (Olsen, 1995). He created a grade prediction model based on a model created by Rowe, Higley, Larsen, and Bills (1985), which predicted the first semester of college grades earned by new freshmen. It utilized high school GPA and ACT scores as predictors. To predict beyond the first semester, Olsen added three other factors to the regression model: year in school, gender, and number of semester credit hours carried. Each college was analyzed separately, along with an analysis of the university as a whole. He utilized a time series analysis of the ratio of actual grades divided by the expected or predicted grades.

The result of his research showed that when the above variables were accounted for, students in some colleges at BYU performed better than would have been expected, while others performed worse than predicted. He termed these phenomena structural grade inflation and structural grade deflation, respectively. A similar study of the last 20 years of grade distributions at BYU could investigate recent data and see if the trends have continued. Furthermore, some variables could be added or removed to improve the model and better predict college GPA. In one sense, this study is a follow-up to Olsen's (1995), but additional questions will help us further understand the data.

Purpose of Study

The purpose of this research is to describe the trend in the average grades awarded at Brigham Young University over the past 20 years and to determine what factors may have influenced this trend.

Research Questions

1. How does mean GPA differ between

    a. Lower-division and upper-division courses

    b. Categories of colleges/schools on campus that differ in their grading philosophies and practices

2. What measurable factors, other than changes in university policies, appear to be associated with the variability in the grade trend at BYU over the last 20 years?

    a. Changes in the qualifications of incoming students (including AP classes taken and average ACT scores)

    b. Change in the qualifications of faculty (including mean Activity Index scores and mean ratings of teachers by students in their courses)

3. To what extent do changes in the average grades awarded at BYU during 1995-2014 appear to be influenced by changes in the university policies on course withdrawal dates and calculating students' mean GPA?

    a. Changes in the policy regarding course withdrawal dates (fall 2011)

    b. Changes in the practice of calculating GPA using courses that were retaken (fall 2011)

4. To what extent have average BYU grades, both baseline GPA and adjusted GPA, increased or decreased during the past 20 years (1994-2014), and how does the trend of each compare with the trend previously reported by Olsen (1995)?

Rationale

It is not likely that the debate on nationwide rising grade trends can ever truly be put to rest, because the topic has reached mythic proportions. However, by examining grades on a smaller scale, the data can be better controlled for consistency and accuracy. Conflicting opinions as to the extent or even existence of grade inflation are due largely to the poor quality and consistency of the data being analyzed.

Before jumping to the seemingly foregone conclusion that students at BYU are being awarded inflated grades, faculty and administrators need to know what is and is not occurring. Some researchers claim that grades are increasing at U.S. universities at higher rates than SAT or ACT scores would predict. Twenty years ago, research revealed evidence that grades in some colleges at BYU appeared to be inflated (Olsen, 1995), but recent data indicate that some conditions influencing BYU grades have changed in the last two decades. Furthermore, departmental and university policies have been implemented in the last two decades that may also impact average grades.

Delimitations

This study will include grade data from undergraduate courses taught at BYU during the fall and winter semesters from winter 1994 through and including winter 2014 in which a student received a grade. Prior research has shown that grades given at BYU during the spring and summer terms follow a different pattern and are statistically higher than grades awarded in similar courses during the fall and winter semesters (Olsen, 1995), so grades from spring and summer terms will not be included. A number of courses taught at BYU involve experiential learning or other teaching methodologies that do not follow a traditional classroom model of

grading. Grades in these courses will be excluded from the data and are outside the scope of this study. Excluded courses will include internships, private lessons, practicums, and seminars.

Definition of Terms

Grade. A judgment by an instructor about the adequacy of an individual student's achievement or performance in a college course.

Grade inflation. A similar quality of academic performance in a given course being awarded higher grades at the present time than before. It refers to a mean upward shift in student grades in the given coursework over time, without a corresponding increase in achievement.

Grade increase. Average grade increase over time.

Baseline GPA. A GPA score that includes grades earned in repeated classes and the original classes in its calculation. All grades from all classes are included.

Adjusted GPA. A GPA score in which grades earned in repeated courses replace the grades earned in the courses taken previously. Grades earned in the original classes are not included.

Mastery-based grading. A grading philosophy in which the student is given multiple opportunities to attain a level of achievement pre-determined by the instructor. All students have the potential to be awarded a high score.

Normative grading. A grading philosophy also known as grading on a curve. Grades are assigned based on the distribution of grades among students in the course. Students are graded according to their relative standing in the class.

Other grading philosophies. Grading philosophies that are neither mastery nor normative. Examples include criterion-referenced, pass-fail, and grading based on clumping or natural breaks in student scores.

CHAPTER 2: LITERATURE REVIEW

Databases Searched

The databases searched included (a) Electronic Theses and Dissertations, (b) Education Resources Information Center, (c) Education Full Text, (d) Dissertations and Theses (ProQuest), (d) ACT website, (e) College Board website, and (f) National Center for Education Statistics. The five search terms used were (a) higher education, (b) grade inflation, (c) grade increase, (d) time series, and (e) grade deflation.

Search Strategy Used

The literature search was limited to higher education because the number of results was too large to sort through if the search included all educational levels. Consequently, research related to grade inflation in high school or other educational institutions was intentionally disregarded. Additional search terms were included one at a time. 'Grade inflation' was the best term to search for, even if the paper referred to the term as 'grade increase,' because the use of the term 'grade inflation' is so widespread.

Procedure

All of the abstracts were carefully scrutinized, and papers were chosen based on relevance to the study issue. The papers were sorted into two main categories: those that included primary research and those that did not but still addressed an important point regarding the topic.

The references section of each paper was analyzed to identify possible additional papers that might fit within the scope of this topic. This method helped discover several papers that were published in discipline-specific journals not included in the initial search. Only completed research studies that focused on undergraduate-level courses and students were included.

Papers not published in peer-reviewed journals were excluded, as well as most studies older than 25 years. News articles and conference papers were excluded. Unpublished studies conducted by individual colleges and universities or university systems are also not included. Non-published studies specific to an individual institution were not in the databases, and as a result, were not included in this study.

Summary of Previous Research

Nationwide grade inflation evidence. Some research appears to present data that convincingly show a clear upward trend in college GPAs. Data also seem to indicate that the proportion of As is increasing, while the proportion of Cs and Ds is shrinking (Jewel & McPherson, 2012; Kamber, 2008; Lawler, 2001; Rojstaczer & Healy 2012; Wilson, 1999). Grade inflation may not be prevalent at every institution of higher education, however. A study comparing over 22,000 student GPAs in the mid-1980s with comparable student GPAs in the mid-1990s reported that evidence of grade inflation was found at some research institutions and those with selective admission standards and that grade deflation occurred at general liberal arts colleges, comprehensive colleges and universities, and in the humanities and social sciences (Kuh & Hu, 1999). However, this report also found evidence supporting the claim that "students' academic effort was rewarded consistently across time at all institutions and major fields, with students who invested more time and effort in their studies reporting higher grades" (Kuh & Hu, 1999, p. 297).

Counterarguments. While most academicians, researchers, and politicians may assume that the preponderance of evidence points to rampant, consistent grade inflation at all universities in the United States over the last 40 years, some researchers counter that the data used as evidence of systemic grade inflation is misinterpreted. Clifford Adelman, a senior associate at

the Institute for Higher Education Policy, recently left the U.S. Department of Education (DoE) after 27 years as a senior research analyst. While at the DoE, he analyzed transcripts from over 3,000 higher education institutions in 1995 and reported that grades had actually declined slightly in the previous two decades (Kohn, 2008). A 2002 report from the National Center for Education Statistics stated 33.4 percent of American undergraduates had GPAs of C or lower for the 1999-2000 academic year (Kohn, 2008). Adelman points out that the research, which claims a nationwide trend, is not standardized and that the unit of measurement is not always clear. Additionally, the data used by these reports is often self-reported by students or appears in newspapers, instead of from official university registrars (Adelman, 2008).

   Possible causes of grade increase. A grade is a judgment made by the professor — a rating, essentially — of the adequacy of the individual student's achievement or performance. Because human judgment is involved, errors in rating can creep into the process. Rater biases and idiosyncrasies can affect the grade that is awarded. There are four types of rater error: generosity error, severity error, central tendency error, and halo error (Worthen, White, Fan, & Sudweeks, 1999). Generosity error is the tendency of some raters to methodically overrate all persons being rated, while severity error is the opposite — the tendency of some raters to systematically underrate all persons they are rating. Central tendency error is the propensity of some raters to avoid extremes and generally only award rates in the middle of the range. Halo error occurs when a rater fails to rate an individual trait separately from an overall trait or impression. A halo error occurs when, for example, a professor overrates a student's writing because the professor feels the student participates fully in class, is friendly to work with, and is good at math — although none of those traits are specific to the written assignments being graded. Halo effects can be positive or negative. Most research on grade inflation attributes

rising average GPA scores to faculty judgment errors, such as these rater errors, even though the research does not specifically list these rating errors by name.

A solid body of research examines the relationships between instructor characteristics and average grades awarded (Jewell, McPherson, & Tieslau, 2013; Sonner, 2000). Jewel and McPherson (2012) found that female instructors inflated grades more than their male counterparts, and that ethnicity did not significantly affect rates of inflation, irrespective of gender. Studies of grades and tenure status or professorial rank (Kezim, Pariseau, & Quinn, 2005; Moore & Trahan, 1998) report that adjunct faculty have the highest rates of grade inflation, lower ranking tenure track faculty have moderate rates of inflation, and full professors have the lowest rates of inflation. Many research studies focusing on instructor effects report a positive correlation between grades and student evaluations of teaching (SET) (Compton & Metheny, 2000; Eiszler, 2002; Greenwald & Gilmore, 1997; Johnson, 2003; McPherson, 2006).

Course-level grade inflation has also been investigated, and a negative correlation has been reported between average grades and class size (Jewell & McPherson, 2012; Sonner, 2000). Students also tend to receive lower grades in courses that are lower-division than students in upper-division courses (Compton & Metheny, 2000; Creech & Sweeder, 2012; Grove & Wasserman, 2004; Jewell & McPherson, 2012; Sonner, 2000).

Very little research has investigated the impact of departmental or institutional policies on average grades. Adelman points out that the slight upward movement of grades from the 1980s to 1990s coincides with a change in higher education grading trends, in which no-credit Ws were introduced and as much as 5.5% of the nation's courses changed from an A-F grading scheme to a pass/fail scheme (Adelman, 2008).

Addy and Herring (1996) concentrated on four accounting courses and the impact of a policy change in which the school implemented a minimum GPA requirement for upper-division students. The authors found that GPAs for high-achieving students remained constant after the policy change. However, lower-achieving students, or those who were predicted to score between the original cutoff (2.0) and the new limit (2.5), were receiving higher grades than predicted. The authors found that these students had been awarded average grades above the 2.5 cutoff line, even though they had been predicted to be below that threshold. The causes of the grade increase were not investigated, but the authors theorized that the increase resulted from instructors inflating the grades of the lower-achieving students.

Jewell and McPherson (2013) attempted to isolate and measure the impact of some of the sources of grade inflation. They studied over 1,600 courses in 28 departments and found that departments do impact grade inflation differentially. Departments that offered PhD degrees were more likely to award lower grades to undergraduate students than those departments without PhD programs. However, department differences accounted for less than 5% of the difference in grades. The largest impact on grades appeared to be unspecified institutional influences (52%) — even ahead of instructor differences (40%).

Marx and Meeler (2013) also investigated the impact of university practices on average grades. They analyzed transcripts from eight public institutions in one Southern state. They illustrate the claim that because schools are changing policies toward grading practices, such as allowing no-credit withdrawals or counting a repeated course for a higher grade, grades are inflated and cannot be adequately compared between institutions.

Sloop (1992) also compared grades between institutions in one state and found that average grades were stable before a HOPE Scholarship was introduced by the state. The HOPE

Scholarship requires students to maintain a minimum GPA, among other requirements. In post-HOPE years, average grades of college students in the state increased each year.

Data Limitations in Previous Studies

As noted previously, much of the information used to support the claim of widespread, uncontrolled grade inflation is based on anecdotal information, such as self-reported student data. Kuncel (2005) showed that student-reported grades were systematically higher than actual grades, particularly for students with lower ability. When institutionally-reported data are used, the authors often do not know or report the unit of measure and the delimitations of their data. This lack of adequate data is true of many nationwide and local studies and is an often an overlooked factor impacting the analysis of grade inflation (Adelman, 2008; Hu, 2005). The strength of a study is directly dependent upon the length of the study period, the number of courses or departments, and the number and type of students included in the data. Frequently, conclusions are overgeneralized from limited samples that are unrepresentative of higher education in the United States. News reports and journal articles have placed a strong emphasis on conclusions drawn from thin supporting data.

In an oft-cited opinion article, Harvey Mansfield, a professor of government at Harvard, blasts Harvard and other elite universities regarding the extreme volume of As and the inflated distribution of "outlandishly high grades" awarded to contemporary students (Mansfield, 2001, p. B24). He blames the changes in faculty grading practices on the Vietnam War, Affirmative Action, and modern child-psychology concerns about students' self-esteem (Mansfield, 2001). However, for all of his accusations, he has no data other than the grades he awards in his own courses. By his own admission, "Because I have no access to the figures, I have to rely on what I saw and heard at the time" (Mansfield, 2001, p. B24). This statement is a clear admission on the

author's part that the data are anecdotal. However, many subsequent researchers and reporters have cited his claim without acknowledging its limitations because it furthers their arguments about rampant grade inflation in the academy.

Another paper frequently cited in grade inflation articles is that of Rojstaczer and Healy (2012), who describe how they acquired the data used for their research to support their claim that the majority of US higher education has a "broken grading system" (Rojstaczer & Healy, p. 18) as follows:

> We assembled our data on four-year school grades…from a variety of sources: books, research articles, random World Wide Web searching of college and university registrar and institutional research office Web sites, personal contacts with school administrators and leaders, and cold solicitations for data from 100 registrar and institutional research offices selected randomly (20 of the institutions solicited agreed to participate…) (Rojstaczer & Healy, 2012, p. 3).

Rojstaczer and Healy go on to describe the fact that historical data were very difficult to acquire, so their grade data prior to 2000 were averaged across schools from year to year, with as few as 13 and as many as 37 schools, depending on the decade. At best, a sample of 37 is a very small proportion of the institutions in the United States and is unlikely to be representative. They also point out that because their time series "[does] not include the same schools every year, we smooth our annual estimates with a moving centered three-year average" (Rojstaczer & Healy, 2012, p. 3). Not only were the data in the aforementioned research not from the same schools each year, but the authors have no way of accounting for institutional differences in how the reported grades were calculated. Adelman's 2008 research was assembled from almost 3,000 institutions since 1972 and found wide variety in the methods used by the schools to indicate grades. In addition to the traditional A-F grades, they found grades such as "X, M, Z, CR, NC,

RP, WP, WF, IP, DE, EI, NW" (Adelman, 2008, p. 18). Adelman also notes that data reported prior to 1972 would not be from a consistent national source, because no official government database existed until that year (Adelman, 2008).

McSpirit, Jones, and Chapman, (2000) used a regression model, controlling for gender, ACT score, and age at an open-enrollment public university. Results indicated a .02 annual rise in average GPA. Grades from students who received a 17 or lower on the ACT were excluded from the data, and the period of time studied was limited to the eight years from 1983 to 1991.

Apple (2002) compared grades in all nursing schools in Tennessee in 1995 to those in 2000. She found that a majority of the colleges did not have a significant grade increase between those years and that percentage of As and Bs did not appear to change. However, the analysis included only Tennessee-Board-of-Regents-certified nursing programs and compared grades between only two individual years that were only 5 years apart.

Zellner (2008) also compared grades in the nursing field at one institution. She compared grades from 1994 and 1996 to grades in 1998, 2000, and 2002, which followed a curriculum change in 1998. The institution wanted to know whether the curriculum change had had an effect on student grades. No attempt was made to control for ACT score, which the author admits could have accounted for the slight grade increase the data showed.

Kwon, Kendig, and Bae (1997) studied one academic division for two years at a small private college. They compared the average GPAs of 99 accounting majors in 1983-1984 with the average GPAs of 205 accounting majors in 1993-1994. Their analysis found that average grades had increased between the two time periods, but the grade increase correlated with an increase in the average age of the students (31 to 34) and average ACT score (19.8 to 22.3) during the same time period. When the correlating variables were taken into account, there was

no statistical increase in student GPAs between these two periods. Nonetheless, the authors are reluctant to give up the idea of grade inflation as the explanation for the GPA increase: "This study suggests that grade inflation has continued throughout the 1980s and early 1990s. However, if other pertinent and statistically significant variables such as age and ACT scores are taken into account, then the rise in grades between the two periods seems to be, to some extent, disproven" (Kwon, Kendig, & Bae, 1997, p. 53).

Clusky, Griffin, and Ehlin (1997) compared ACT scores of seniors to overall GPAs for all university courses, all business college courses, and four individual senior accounting courses over 15 years. Only four senior-level courses were included in the study, but results regarding the four courses were generalized to the entire department. The authors assume that while grade inflation existed at the university and college level, it "was not pervasive within accounting courses" (Clusky, Griffin, & Ehlin, 1997, p. 273).

Kezim, Pariseau, and Quinn (2005) studied a business school in a small private college, comparing grades awarded by full-time, part-time, and adjunct faculty. However, the sample sizes were small — in one analysis, there were only seven individuals. Their results showed that adjunct faculty had the highest rates of grade inflation and tenured faculty had the lowest rates of grade inflation.

Grove and Wasserman (2004) studied the GPA patterns in individual students as they progressed from semester to semester. They found that when they excluded grades from students who had failed and dropped out of school, the average GPA increased. They acknowledged that for overall GPA trends, "Attrition played a much greater role in the rise of academic achievement after the second semester of college coursework, accounting for over 40 percent of the total" (Grove & Wasserman, 2004, p. 167). It makes sense that if grades that are below average are not included in the calculations, then the average grade will be higher than expected.

Conclusions

With grade inflation apparently a foregone conclusion, much of the research focuses on the causes of inflation and the division of blame. Faculty are generally the object of this finger-pointing, and researchers assume that faculty generosity is the main cause of increased GPA averages. Other factors, such as institutional policies and student qualification levels (e.g., ACT scores), are sometimes believed to increase average GPAs. Some researchers attempt to point out that rising average GPAs do not necessarily indicate a negative factor at work or that the increased grades are unjustified, but these opinions appear to be in the minority.

Because faculty and administrators rely on what most newspapers and journal articles report, they assume it is a fact that grades are steadily increasing nationwide without a complimentary increase in student achievement. In article after article, statistics are cited that purport to prove grade inflation, but this is done without a clear explanation of the limitations of the anecdotal data used to support the authors' conclusions or of the small or unrepresentative sample that the author's generalizable inference is based upon. Subsequent authors cite the previous research, again without explaining the limitations of the data, and the assumptions are perpetuated.

The data used in prior studies are often not well described. For example, when researchers compare ACT data with GPA, rarely does the researcher specify if the ACT data for that year is for all students included in the GPA group or if it only represents incoming students for that year. Also, when GPA or ACT scores are included, it is not often reported whether those data include data from transfer students or concurrent enrollment students, in addition to traditional students, for instance. Researchers studying grade inflation must be more explicit in describing the data used in their analyses, especially when they are extrapolating conclusions for larger populations based on sample data.

CHAPTER 3: METHOD

Population and Dependent Variable

The population of interest in this study is letter grades earned by all undergraduate students enrolled at BYU for at least one class during day school on the Provo campus during any fall or winter semester in the 20-year period from September 1994 through and including April 2014. Grades earned in pass/fail graded courses are not included. Grades earned by undergraduate students taking graduate-level courses were included, but grades earned by graduate students were not included, regardless of the courses in which they were awarded. Credit awarded for AP courses is not graded and therefore not included in the GPA data. Grades earned in concurrent enrollment courses by high school students are not included. Only grades earned during fall and winter semesters were included; grades earned in spring and summer terms were excluded. Study data included grades for independent study courses earned by enrolled undergraduates if these were awarded during a fall or winter semester. Grades earned at the BYU Salt Lake Center or in evening classes are included in the GPA data only if the student was also enrolled in at least one class during day school on the main campus during the same semester. Transfer grades from courses earned at other institutions were excluded.

A number of courses taught at BYU involve experiential learning or other teaching methodologies that do not follow a traditional classroom model for grading. Grades in these courses were excluded from the data and are outside the scope of this study. Excluded courses include (a) internships, (b) study abroad courses, (c) private lessons, (d) student development courses, (e) practicums, and (f) seminars. The GPA data used in this model are the reported GPAs that appear on students' official transcripts. Reported GPA is equal to the adjusted GPA prior to fall 2011 and the baseline GPA from fall 2011 until the present.

The GPA data used in this study were obtained from archived records maintained by the Registrar's Office and represent approximately 6.5 million individual course grades. The annual mean course grades were aggregated by course level (100- and 200-level courses in one group per college, and 300- and higher level courses in a second group per college), by college, and by semester. The upper and lower division course means of each college were weighted by the number of graded student credit hours. These college means were then grouped into one of three grading philosophy categories. Cross-classifying the two course levels (upper and lower division) by the three types of grading philosophies (mastery, normative, and other) produced six observational units per semester.

The annual mean GPAs in Table 1 are weighted aggregates of the six observational groups across each of the two semesters within each year. The standard deviations reflect the variability of the observational units about the annual grand mean. The definitions of student credit hours, college grading philosophy, and course-level groupings will be explained in further detail later in this chapter.

In 2009, the College of Health and Human Performance was disbanded, and the four departments within the college were dispersed among three other colleges. For the purposes of this analysis, data for this college and its departments are excluded prior to its dissolution in 2009. Data for those same departments are included in their new colleges after 2009.

Variables Included in Analysis

Student variables. Data on two variables were gathered as indicators of changes in the scholastic ability of the student body across years: (a) the mean ACT score of the enrolled freshman class each year and (b) the mean number of AP credits per student brought in by the enrolled freshmen class each year (Table 2). It should be noted that the mean ACT score and

mean AP credits for each year are based only on enrolled freshman during the corresponding year, while the mean GPA data include all undergraduate students taking classes in a given college group, course level, or semester. The ACT and AP data represent scores from approximately 20-25% of the corresponding GPA population each year. Table 2 displays the mean, standard deviation, and minimum and maximum year values for ACT and AP credits for enrolled freshmen over all the years in the study period.

Table 1

GPA by Academic Year

Year	M	SD
1994	3.269	0.140
1995	3.265	0.147
1996	3.271	0.150
1997	3.296	0.150
1998	3.304	0.159
1999	3.318	0.153
2000	3.343	0.142
2001	3.346	0.145
2002	3.348	0.133
2003	3.328	0.152
2004	3.324	0.147
2005	3.334	0.147
2006	3.330	0.149
2007	3.331	0.140
2008	3.337	0.149
2009	3.346	0.146
2010	3.338	0.149
2011	3.324	0.169
2012	3.334	0.165
2013	3.337	0.164

Table 2

Summary Statistics for ACT, AP Credits, and Faculty Activity Index

Variable	M	SD	Min	Max
BYU Freshman mean ACT	27.384	0.548	26.502	28.358
BYU Freshman mean AP credits	16.916	1.499	14.541	20.427
Faculty Activity Index	.635	.057	.466	.770

Faculty variables. Two potential indicators of teaching quality were included in the analysis: (a) the activity index (AI), which is an indicator of faculty research quantity (Table 2), and (b) student evaluations of teaching (SET), an indicator of faculty teaching quality (Table 3). The AI score is the proportion of faculty with research expectations in each college who produced at least one peer-reviewed publication during a given calendar year. AI data are maintained and reported yearly by the Office of Research and Creative Activities for the years 1994-2008 and by the Faculty Center from 2009 to the present. The AI scores for each college were weighted by student credit hours when calculating each group mean. The summary statistics in Table 2 represent the mean, standard deviation, minimum, and maximum of the AI scores for each calendar year and college group.

Table 3

Summary Statistics for Student Evaluations of Teaching

Variable	M	SD	Min	Max
SET Overall Instructor – paper	5.779	0.036	5.720	5.854
SET Overall Instructor – 8 point good	6.850	0.194	6.448	7.084
SET Overall Instructor – 8 point unbalanced	6.535	0.246	5.993	6.791
SET Overall Instructor – 8 point good current	6.925	0.150	6.534	7.124

SET data are reported to the Associate Academic Vice President each semester and include overall instructor (OI) scores, as shown in Table 3. The SET instrument includes additional questions related to the course and instructor, but for this study, only OI responses were analyzed. SET data are

complicated because the survey method and scale has changed several times within the 20-year period of this analysis. Prior to fall 1996, no uniform university data were recorded. The statistical model used to analyze these data used a dummy variable to model the pre-1996 SET data. From 1996 through fall 2002, all university courses were surveyed each semester via a standard university-wide survey. This survey is labelled in this study as SET Overall Instructor – paper. This paper questionnaire was given to each student during a class period near the end of the semester. The professor was instructed to leave the room, and a teaching assistant or another student collected the completed surveys into a manila envelope and delivered them to the Testing Center for scanning. Data for each question were reported on a 7-point Likert scale. Since fall semester 2002, the survey has been administered electronically. Two weeks prior to the end of the semester, students are emailed a link to complete an online survey for each of their courses. Data for the online questions are reported on an 8-point Likert scale, labelled in this study as SET Overall Instructor – 8 point good. From fall semester 2003 to winter semester 2007, the response options for two questions (OI and OC) were modified from the 2003 version of the survey, labelled in this study as SET Overall Instructor – 8 point unbalanced. In winter 2007, the labels reverted back to the 2003 version of the survey, labelled in this study as SET Overall Instructor – 8 point good current. See Appendix A for more specific information regarding the different SET forms. The model is adjusted for each of these four periods, with the current instrument receiving the most attention in the discussion.

The mean SET scores for a given course are based on the number of students who answered the question on the survey, not the total number of students in the class. Similarly, the mean SET score for a given college is the average score given to instructors in that college by responding students only. However, the mean SET scores for each college and course-level group each semester and academic year were weighted by using the total student credit hours

when the group means were calculated. SET data include only responding students; student credit hour data include all graded students. The summary statistics in Table 3 represent the mean, standard deviation, minimum, and maximum of the SET scores of the observational units for each instrument used. To review, an observational unit is the college grading philosophy group, course level, semester, and year, weighted by student credit hours graded. The definitions of student credit hours, college grading philosophy, and course-level groupings will be explained in further detail later in this chapter.

University variables. As explained in greater detail in Chapter 1, the university administration announced a policy change in mid-2009 regarding the calculation of GPA and repeated courses, which was intended to take effect the following year. Students would no longer be able to retake a course and have the subsequent grade replace the prior grade in the calculation of their GPA. The policy change also extended the course withdrawal deadline to approximately halfway through the semester. Due to confusion over the changes, the policy was not enforced until the fall 2011 semester. For the semesters between fall 2009 and winter 2011, the policy was not enforced, even though it had been announced. For decades prior to fall 2009, the difference between the university mean adjusted GPA (GPA that includes the replaced grades) and the mean baseline GPA (GPA that includes all courses and does not replace grades) had been fairly constant, with a difference of about .10. However, for the two policy change interim years, the difference was smaller. For statistical and practical purposes, the policy interim period is defined as the period between fall semester 2009 and fall semester 2011, and the policy implementation date is marked as the end of the fall 2011 semester. Consequently, the reported GPA is identical to the adjusted GPA prior to fall 2011 and to the baseline GPA from fall 2011 to the present.

Additional Study Variables

For the purposes of this study, the various colleges and schools at BYU that offer undergraduate courses were classified into three categories based on the most prevalent grading philosophy used by faculty within each college or school. Brookhart (2004) explains that grading is a comparison of a student's performance to something else. The comparison can be made against a pre-determined level of achievement, or it could be a comparison of the students' achievement in relation to the performance of other students.

Grading philosophies. Mastery-based grading is a grading philosophy in which students are given multiple opportunities to demonstrate that they have attained a level of proficiency that is specified in advance by the course instructor. This type of grading is also referred to as standards-based grading. Students who achieve the specified level of achievement would receive the highest grades, while those students who do not meet the pre-determined standard would receive lower grades, depending on their achievement in comparison with the standard. In the context of this study, the colleges included in this category are those in which the instructor sets a level of achievement and students are given assistance and repeated opportunities to reach that level of achievement. An example would be an advanced writing course in which the goal is for all of the students in the course to be skilled writers at the end of the course, instead of only a specific percentage of the students. A teacher in these courses is seen as successful if most students in the course are able to achieve the expected level of accomplishment.

Normative grading is a philosophy in which students are graded primarily based on their relative standing in the class. These courses are graded on the assumption that students' level of achievement in a course can usually be expected to vary considerably, with most students at or near average, a relatively small proportion who reach achievement levels well above average,

and some who demonstrate very poor levels of achievement. For instance, a class may have a mean score of 80, with most students earning a B and only the top percentage of students earning an A grade. An instructor in these courses is expected to maintain approximately the same distribution from year to year. Hence, grades above the mean department GPA standard can be construed as evidence of grade inflation.

I interviewed an associate dean and several faculty members in each college or school to determine how the courses in the college should be classified in terms of the three grading categories. While it is clear that no college or department has unanimity in terms of grading philosophies and practices, for the purpose of this study, we considered the overall majority opinions and practices of the departments within the colleges and the evaluation practices of each college dean's office. The classification assignment for each college was made in conjunction with the associate dean and faculty who were interviewed. Colleges with general grading philosophies that do not clearly fit into either the mastery-based category or the normative category were grouped into a category classified as *Other*. Table 4 shows the college grading philosophy classifications. Future researchers may develop different classifications than the ones assigned in this study.

Course level. Lower-division courses are those listed at the 100 or 200 level and are generally taken by freshmen and sophomore students. These classes tend to be large (over 50 students) introductory courses. Many of the lower-division courses serve majors in multiple departments and colleges so students in these courses can come from all areas of campus.

Upper-division courses are those designated as 300-level or higher and are predominately taken by juniors and seniors. These classes tend to be smaller (fewer than 50 students) and cover more advanced topics. Upper-division courses are generally taken by students within the major

of the department offering the course. The upper-division category may also include some 500-level courses if these courses were taken by a student who was an undergraduate at the time. Generally, a 500-level course is a graduate-level course but undergraduate students are occasionally allowed to take a graduate course with this level designation.

Table 4

Grading Philosophy Classifications

College or School	Type of Grading Used
College of Fine Arts and Communications	Mastery
College of Humanities	Mastery
College of Nursing	Mastery
David O. McKay School of Education	Mastery
College of Life Sciences	Normative
College of Physical and Mathematical Sciences	Normative
Marriott School of Management	Normative
College of Family, Home, and Social Sciences	Other
College of Religious Education	Other
Ira A. Fulton College of Engineering and Technology	Other

Student credit hours. Most university courses are 3 credit hours, but range from a low of .5 credit hours to a high of 4 credit hours. A student credit hour represents one credit hour per grade per student. For example, ten students receiving grades for a 3-credit class is equal to 30 student credit hours. Classes were sorted into college categories based upon the college in which the course was taught.

The distribution of lower- and upper-division courses that were offered during the 20-year period from September 1994 to April 2014 is shown in Table 5. Because the proportion of upper-division courses, lower-division courses, and the total number of student credit hours taught varies from one college to another, each college or school has a different impact on GPA calculations for

the university overall. The distribution of student credit hours graded between the grading philosophy classification groups is fairly even, as seen in Table 6.

Statistical Model Exploration and Specification

The definition of the observational unit appeared in the prior section, but now that the college groups and course levels have been clearly defined, it is worth reviewing. An observational unit represents the college grading philosophy group and course level for one semester of one year. This means the 2013-2014 academic year yields 3 grading categories x 2 course levels x 2 semesters x 1 year = 12 observations.

Table 5

Number and Percent of Student Credit Hours Graded by Lower- and Upper-Division Courses from 1994-2014 by College or School

College or School	Lower Division		Upper Division		Total	
	n	% of Total	*n*	% of Total	*n*	% of Total
College of Fine Arts and Communications	460,791	8.093%	219,967	3.863%	680,758	11.956%
College of Humanities	383,353	6.733%	364,154	6.395%	747,507	13.128%
College of Nursing	15,153	0.266%	19,780	0.347%	34,933	0.614%
David O. McKay School of Education	21,803	0.383%	112,398	1.974%	134,201	2.357%
College of Life Sciences	393,214	6.906%	311,250	5.466%	704,464	12.372%
College of Physical and Mathematical Sciences	597,195	10.488%	183,851	3.229%	781,046	13.717%
Marriott School of Management	119,308	2.095%	361,562	6.350%	480,870	8.445%
College of Family, Home, and Social Sciences	577,248	10.138%	355,933	6.251%	933,181	16.389%
College of Religious Education	537,577	9.441%	386,641	6.790%	924,218	16.232%
Ira A. Fulton College of Engineering and Technology	116,014	2.037%	156,766	2.753%	272,780	4.791%
Combined Total	3,221,656	56.580%	2,472,302	43.420%	5,693,958	100.000%

Table 6

Number and Percent of Student Credit Hours Graded by Lower- and Upper-Division Courses from 1994 to 2014 by College Grading Classification

College Classification	*Lower Division*		*Upper Division*		*Total*	
	n	% of Total	*n*	% of Total	*n*	% of Total
Mastery	881,100	15.474%	716,299	12.580%	1,597,399	28.054%
Normative	1,109,717	19.489%	856,663	15.045%	1,966,380	34.535%
Other	1,230,839	21.617%	899,340	15.795%	2,130,179	37.411%
Combined Total	3,221,656	56.580%	2,472,302	43.420%	5,693,958	100.000%

A regression analysis with covariates and potential interaction terms was used to explain how changes in grades in these observational groups over time have been influenced by changes in (a) the scholastic ability of the student body, (b) the faculty scholarly activity level, and (c) the grading policies at the university. In this study, mean GPA is the dependent variable. Mean ACT score, type of college grading philosophy, course level (upper versus lower division courses), semester, year, faculty AI, and SET were used as potential explanatory variables.

A two-factor interaction occurs when the mean difference in the levels of one factor is not the same across the levels of a second factor. For example, the mean GPAs in mastery-graded courses may be higher than the mean GPAs of normative graded courses, and mean GPAs of upper-division courses may be higher than mean GPAs in lower-division courses. However, the difference between the mean GPA scores of upper- and lower-division mastery-graded courses might not be the same as the difference between the mean GPA scores of upper- and lower-division normative-graded courses.

The effect of faculty research (AI) on mean GPA is passionately debated by scholars. From one point of view, teaching responsibilities and research responsibilities are viewed as competing demands for faculty time, with the implication being that "teaching" faculty have

greater concerns for student success than "researching" faculty. Others argue that research supports teaching, enables faculty to be current in their field, and adds significant value to a well-prepared student's learning.

Sometimes, adding additional explanatory variables to the model reduces the degree of residual or error because they explain a part of the change that was not explained by the explanatory variables already in the model. However, when the explanatory variables are highly correlated, we can choose between the two explanatory variables. Because mean ACT scores and mean AP credits are highly correlated, the model uses mean AP credits because this results in a smaller residual mean square.

A 3-factor interaction occurs when a 2-factor interaction between two variables is not the same across the levels of a third variable. The policy change may affect the interaction between lower- and upper-division courses and college grading philosophies differently. The policy change included two parts: (a) students would not be able to replace a lower grade with a higher grade from the same course taken subsequently (potentially lowering GPAs in normative lower-division courses), but (b) students could now withdraw from a course much later in the semester (potentially raising GPAs in upper-division mastery courses). If the differences between the mean GPAs of the six observational units before the policy change are different than the differences between the mean GPAs after the policy change, this would be evidence of a 3-factor interaction.

The period of time between the announcement of the policy change and its implementation lasted two years. Informed students knew they had only the next few semesters to retake a course and have it replace a lower grade on their GPA calculation. It is very likely

that this interim policy change period will also have an effect on the mean GPA that is different than the effect on mean GPA caused by the policy change.

The 2-factor interaction of college grading philosophy and course level may also be affected by SET scores differently. Faculty SET includes both overall course (OC) and overall instructor (OI) scores. Because OC and OI are highly correlated, we include only OC to keep the model simple. We will explore a three-factor interaction between college classification, course level, and SET OC scores in the model.

The yearly mean GPA data provided to us included both fall and winter semester mean GPAs. We will explore the potential effect of semester on the mean GPA scores of each of the observational groups, although we do not anticipate that the semesters will impact mean GPA differently.

Adjusting for student quality, faculty quality, college group, course level, and semester, the effect of all other factors that affect GPA will be modeled using a yearly trend. This will be modeled as a nonlinear effect, allowing for the flexibility to capture the degree of the effect and provide meaningful extrapolation that will be used to forecast future mean GPAs. This effect is not the underlying grade trend, because other explanatory variables are time-varying.

Because the mean GPA scores constitute time series data, we also expect the mean GPA data to be serially correlated across years. In other words, the average for a given year is likely to have been influenced by the average of most recent past years. This analysis will ignore the serial correlation. The estimates will be unbiased, but the standard errors may be smaller than if the serial correlation had been modeled.

CHAPTER 4: RESULTS

Model

The weighted mean GPA for the ith college group, j^{th} course level, k^{th} semester, in year t is denoted by $\text{gpa}_{ijk}(t)$ and modeled by

$$\text{gpa}_{ijk}(t) = \alpha_{ij} + \text{bs}_{ij}(t) + \beta_1 AP + \beta_2 \text{faculty research}_i(t) + \beta_3 \text{SET}_{ij}(t)$$
$$+ \text{ effect of previous SET instruments}_{ij} + \gamma_{ijk} + \theta_{ij} + \varphi_{ij} + \epsilon_{ijk}(t)$$

where:

- α_{ij} denotes the mean GPA for courses in college group i and course level j

- $\text{bs}_{ij}(t)$ denotes the nonlinear yearly trend as modeled by separate B-splines for each college group i and course level j

- AP is the mean AP credits of entering freshmen in academic year t

- faculty research is the Faculty Research Activity Index in year t

- γ_{ij} denotes the effect of semester k on mean GPA for courses in college group i and course level j

- θ_{ij} denotes the difference in mean GPA due to the change in university GPA policy for courses in college group i and course level j

- φ_{ij} denotes the difference in mean GPA that occurred in the interim period before the change in university GPA policy for courses in college group i and course level j

- $\epsilon_{ijk}(t) \sim N(0, \sigma)$.

- Estimation and inference are based on multiple regression.

Research Question 1

How does mean GPA differ between the following:

    a.   Lower-division and upper-division courses.

    b.   Categories of colleges/schools on campus that differ in their grading philosophies and practices.

College grading philosophy and the course level variable have an interactive effect on mean GPA. After adjusting for all other factors in the model, the mean GPA of normative lower-level courses is 3.090, which is the lowest mean of the six groups (Table 7). Normative upper-division courses are 0.200 higher, with a mean GPA of 3.290. Mastery upper-division courses have the highest mean GPA, at 3.530; mastery lower-division courses are 0.135 lower, with a mean GPA of 3.395. The mean GPA of upper-division courses is consistently higher than their lower-division counterparts. However, there is an interaction between college group and course level because the difference between the upper- and lower-course means of the normative colleges (0.200) is larger than the difference between the upper- and lower-course means of the mastery colleges (0.135). While not a focus of the discussion, the difference between the upper- and lower-course mean GPAs of the other group (0.131) is closest to that of the mastery group.

Table 7

Estimates of Mean GPA of Observational Units (α_{ij}) Holding all other Variables Constant

College Group and Course Level	Estimate	SE	t value	p
Mastery Lower-Division	3.395	0.278	12.230	< .001
Mastery Upper-Division	3.530	0.278	12.699	< .001
Normative Lower-Division	3.090	0.277	11.162	< .001
Normative Upper-Division	3.290	0.277	11.875	< .001
Other Lower-Division	3.215	0.278	11.585	< .001
Other Upper-Division	3.346	0.278	12.055	< .001

Research Question 2

What measurable factors other than changes in university policies appear to be associated with variability in the grade trend at BYU over the last 20 years?

    a. Changes in the qualifications of incoming students (including AP classes taken and average ACT scores)

    b. Changes in the qualifications of faculty (including mean Activity Index scores and mean ratings of teachers by students in their courses)

The mean AP credits of enrolled freshmen are significantly correlated ($p = 0.001$) with mean GPA (Table 8). When the number of AP credits brought in by enrolled freshmen increased by one credit, mean GPA increased by 0.008, holding all other variables constant.

Table 8

Estimates of AP, Faculty Activity Index, and SETs (βs), Holding all other Variables Constant

Variable	Estimate	SE	t value	p
Mean AP credits	0.008	0.003	3.296	.001
Faculty Activity Index	-0.034	0.019	-1.745	.083
SET Overall Instructor – 8 pt good current	-0.027	0.040	-0.666	.506
unbalanced8	-0.249	0.197	-1.267	.207
SET Overall Instructor – 8 pt unbalanced	0.009	0.019	0.493	.623
old8	0.244	0.265	0.918	.360
SET Overall Instructor – 8 pt good	-0.058	0.020	-2.986	.003
Paper	-1.531	0.414	-3.694	<.001
SET Overall Instructor - paper	0.237	0.058	4.101	<.001
Pre-university-wide SET	-0.159	0.276	-0.578	.564

Most faculty have research expectations while also teaching a full load of classes. Faculty research activity is marginally significantly correlated ($p = .083$) with mean GPA (Table 8). While not significant at the .05 level, increasing faculty research appears to result in a slight decrease in mean GPA, holding all else equal.

College group and course level capture the effect of SET on GPA, and there is no further statistically significant relationship (Table 8). This was a surprising finding. It appears that grading philosophy could be the driving factor in student evaluations of teaching — not mean GPA, as most research suggests (Compton & Metheny, 2000; Eiszler, 2002; Greenwald & Gilmore, 1997; Johnson, 2003; McPherson, 2006). As explained in the previous chapter, there were multiple versions of the SET instrument that were utilized over the study period, and data from each of these instruments are modeled as individual variables. The paper version of the SET is the only one that is significantly different from the current SET. We hypothesize that this is due to selection bias (instructors could choose to participate), not the questions or measurement scale.

The mean GPA data were reported by semester and included fall and winter semesters each year, allowing a comparison between semesters (Table 9). Winter semester mean GPA is significantly lower ($p = .042$) for normative lower-level courses. This finding was not expected and could be investigated further. Two possible explanations are differences in faculty grading practices between semesters and differences in the types of courses in the students' schedules between semesters.

Table 9

Mean Difference Between Winter and Fall Semester (γ_{ij}) GPA Averaged Across Years Adjusting for all other Variables

College Group and Course Level	Estimate	SE	t value	p
Mastery Lower-Division	-0.001	0.004	-0.289	.773
Mastery Upper-Division	0.003	0.004	0.663	.508
Normative Lower-Division	-0.009	0.004	-2.048	.042
Normative Upper-Division	0.004	0.004	0.978	.329
Other Lower-Division	0.006	0.004	1.361	.175
Other Upper-Division	0.001	0.004	0.175	.861

Research Question 3

To what extent do changes in the average grades awarded at BYU from 1995 to 2014 appear to be influenced by changes in the university policies on course withdrawal dates and calculating students' mean GPA?

  a. Changes in the policy regarding course withdrawal dates (fall 2011)

  b. Changes in the practice of calculating GPA using courses that were retaken (fall 2011)

The policy change had no significant effect on mean GPA (Table 10). However, while not significant at the .05 level, it is interesting that mastery lower-division courses were positively impacted by the policy change and normative lower-division courses were negatively impacted by the policy change. Lower-division mastery courses comprise 15.474% of all university student credit hours, while lower-division normative courses comprise 19.489% of all university student credit hours (Table 5). These groups impact university mean GPA comparatively and, essentially, each cancels out the effect of the other from the point of view of a main effect. However, it should be noted that in Table 1, the standard deviation of the mean GPA increased after the policy change. This increase may be further evidence that the policy change impacted the GPAs of the observational groups differently.

Table 10

Estimates of Policy Change (θ_{ij}) Holding all other Variables Constant

College Group and Course Level	Estimate	SE	t value	p
Mastery Lower-Division	0.004	0.025	1.784	.076
Mastery Upper-Division	-0.016	0.022	-0.743	.458
Normative Lower-Division	-0.046	0.026	-1.780	.077
Normative Upper-Division	-0.016	0.022	-0.722	.471
Other Lower-Division	0.004	0.023	0.174	.862
Other Upper-Division	-0.023	0.022	-1.038	.301

As described in Chapter 1, the policy change was announced in the fall 2009 semester, with a planned implementation date of the following year, in the fall 2010 semester. Students would have one year to retake a course and replace a previous grade with the new grade. Due to confusion over the date and concerns from students who were away from school serving two-year missions for the Church of Jesus Christ of Latter-day Saints, the deadline for the policy change was set back another year, to the fall 2011 semester. The results show that this interim period did not have an effect on the mean GPAs of most courses (Table 11). However, for mastery-based lower-division courses, there is a statistically significant ($p = .040$) local effect, a .028 increase in mean GPA. It is possible that more lower-division mastery courses were retaken during the interim period than other types of courses. Because many of the lower-division normative courses are sequential in that students must pass the course before taking the next course in succession, those courses had already been retaken before this interim period. If courses were retaken at similar rates, it is probable that the retaken courses in lower-division mastery courses received higher replacement grades than the courses retaken in other college categories. The initial grade would be replaced with the repeated grade, whether it was higher or lower than the original grade.

Table 11

Estimates of Policy Interim Period (φ_{ij}) Holding all other Variables Constant

Variable	Estimate	Std. Error	t value	p
Mastery Lower-Division	0.028	0.014	2.064	.040
Mastery Upper-Division	0.001	0.013	0.091	.927
Normative Lower-Division	0.004	0.014	0.258	.797
Normative Upper-Division	0.000	0.013	0.010	.992
Other Lower-Division	0.022	0.013	1.641	.102
Other Upper-Division	-0.009	0.013	-0.705	.482

Research Question 4

To what extent have average BYU grades, both baseline GPA and adjusted GPA, increased or decreased during the past 20 years (1994-2014), and how does the trend of each compare with the trend previously reported by Olsen (1995)?

This research question was investigated by looking at the effect of year before and after fall 2011 after adjusting for all other explanatory variables. Models often use a linear or quadratic effect for their trends. We investigated (a) linear, (b) quadratic, (c) cubic, and (d) quartic models for year. While there are different qualities of fit among the four models, the extrapolation used to predict future grades as a consequence of model specification was very poor. Figure 1 displays the various polynomial models. Various polynomial models are overlaid on the plot of mean GPA for normative lower-division courses over the 20-year period. If the purpose of the model was only to explain existing data, a polynomial model could be considered sufficient.
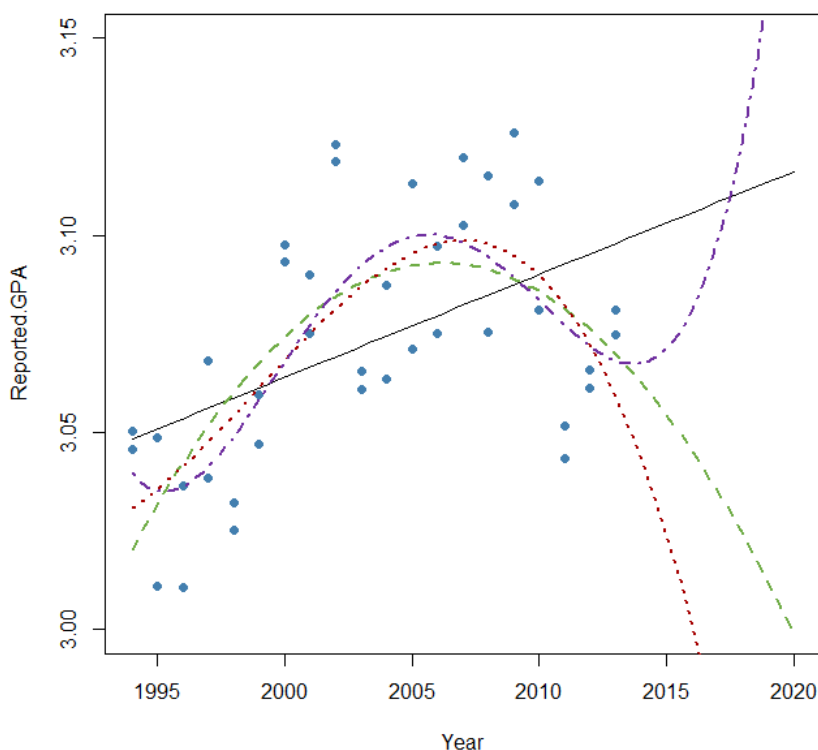

Figure 1. Plot of mean GPA for normative lower-division courses over the 20-year period with possible linear, quadratic, cubic, and quartic models.

To model the existing data and provide satisfactory forecasting, B-splines with knots were chosen for each college group and course level (Figure 2). These splines allow a flexible fit to the observed data. Boundary knots were set at 1994 (the beginning of the study period) and at 2009 (the date of the policy change announcement). Interior knots were chosen for each college group and course level based on graphical fit (Table 12). For example, the internal knot for lower division courses in the other grading category was 2002.5, or halfway through 2002. B-splines constrain extrapolation beyond the boundary knot so that it is linear and represents the belief that recent grade trends will continue.
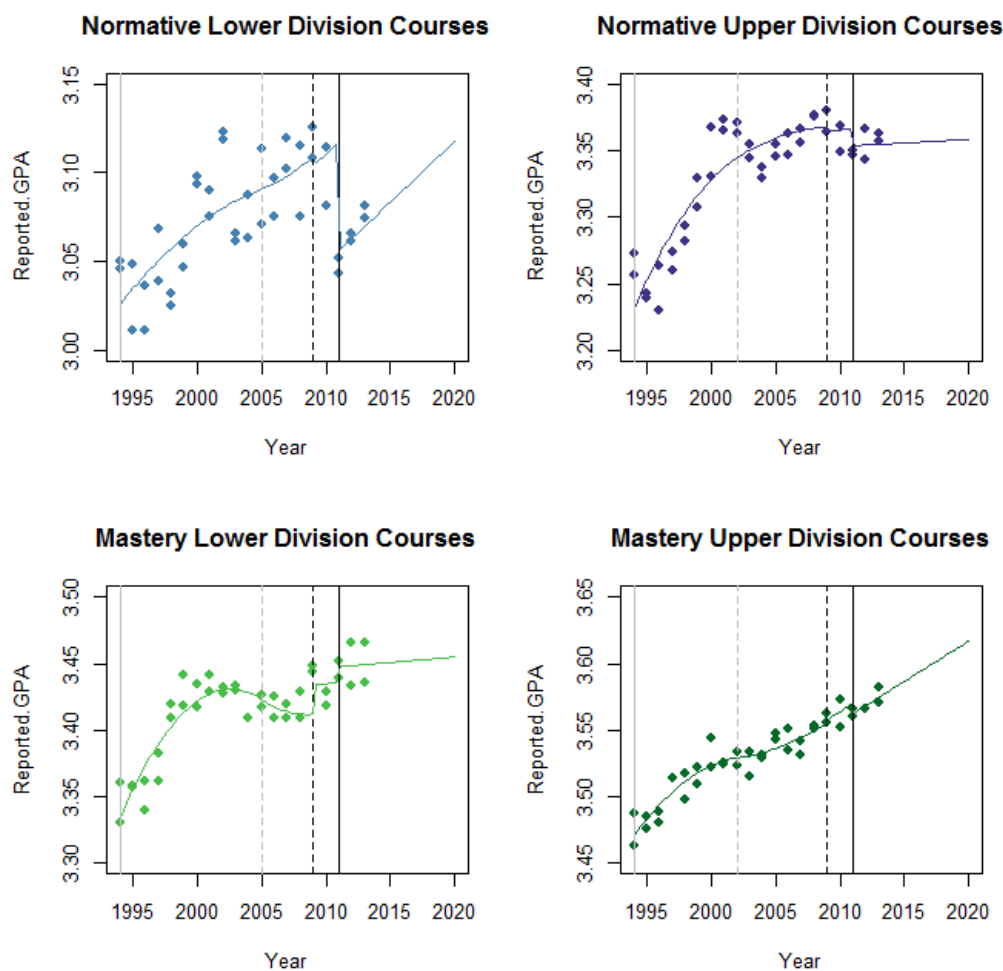

Figure 2. Year trend using B-splines

Table 12

Location of Internal Knots

College Group and Course Level	Year
Mastery Lower-Division	2005
Mastery Upper-Division	2002
Normative Lower-Division	2005
Normative Upper-Division	2002
Other Lower-Division	2002.5
Other Upper-Division	2002

Figure 3 shows the effect of year, with all variables except for policy change, college group, course level, and semester being held constant. This, in a sense, is the overall trend for each of the college classification/course level combinations. Grades in all groups were trending slightly up prior to the early 2000s. This upward trend could be due to many factors, including what is colloquially referred to as grade inflation. The mean GPA for lower-division normative
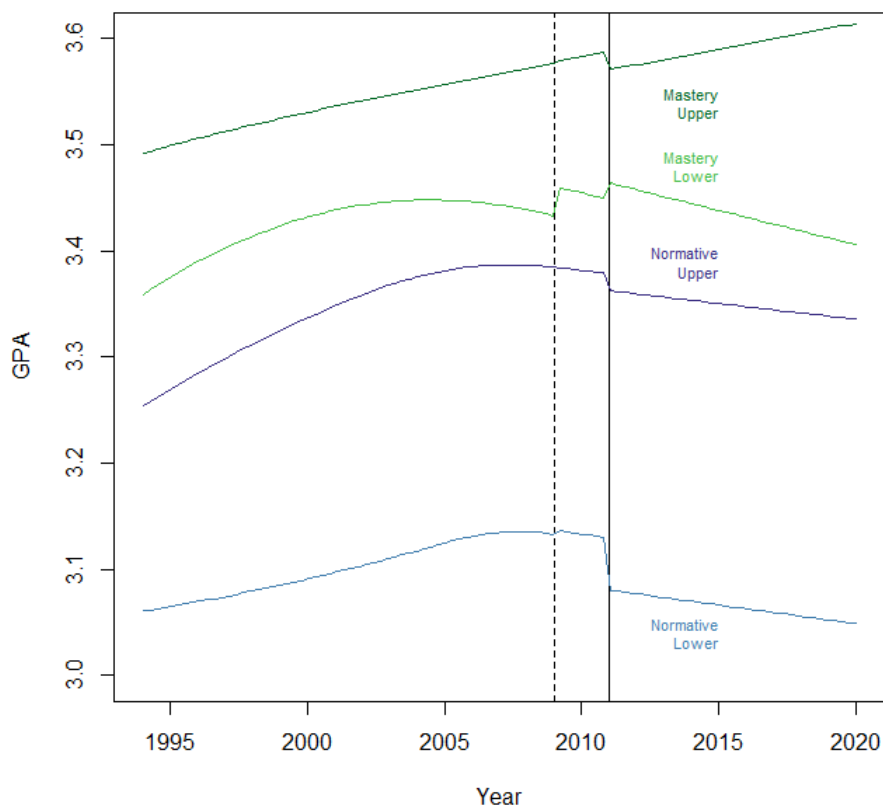

Figure 3. Grade trends by observational unit.

courses continued this upward trend until 2006 or 2007, but it then plateaued and began to decrease. If this downward trend occurs, it may be evidence of grade deflation. Mean GPAs in this group were significantly reduced due to the policy change, as discussed previously. Upper-division normative GPAs leveled out around 2005, with a possible small downward trend being extrapolated for the future. Both upper- and lower-division normative GPAs appear to have generally similar trends, although the intercepts are different.

Lower-division mastery courses had the same upward trend as the other courses. GPAs in lower-division mastery courses leveled off a little earlier (early 2000) and stayed generally constant until the date of the policy interim period. GPAs increased slightly during and just after the interim period and have a generally flat or slightly downward trend since that time. In contrast, the upper-division mastery courses continue to have an upward, linear trend through the change to baseline GPA.

Olsen (1995) used a different method to evaluate grade inflation for the years 1974-1994 than was used in this study. He created a regression model to predict the expected GPA of students. The expected GPA and actual (historical) GPA were compared over time as a ratio. If the expected GPA was lower than the actual GPA, this was labeled as structural grade inflation, and if the expected GPA was higher than the actual GPA, this was labeled structural grade deflation. Each college or school was studied separately. Olsen reported that although some colleges experienced structural grade inflation or structural grade deflation, the mean GPA in most colleges was increasing at slightly higher rates than would be predicted. He estimated that the mean university GPA would increase at the rate of 2% in the following 10 years. The results of this study show that mean GPA did increase as predicted during that time period.

Prediction

Predicting mean GPA using the model is complicated due to the time-varying explanatory variables. The model used to predict GPA for just one year into the future includes $AP(t + 1)$, faculty research$_{ij}$$(t + 1)$, and $SET_{ij}(t + 1)$. While a more sophisticated model could be used, a simple approach is an ARIMA time series model that extrapolates the historical trend. Table 13 contains the forecast values used to predict mean GPA, but different values could be used to represent administrative expectations, which would result in somewhat different predictions. ARIMA(1,1,1) was used for these terms, except $AP(t)$, which used ARIMA(1,1,0).

Table 13

Forecast Values Used to Predict Mean GPA for the Next Seven Years

| | | | Normative Group | | | Mastery Group | | |
| | | | *lower* | *upper* | | | *lower* | *upper* |
Year	*AP(t)*	*AI(t)*	*SET(t)*	*SET(t)*	*AI(t)*		*SET(t)*	*SET(t)*
2014	20.555	.708	6.717	6.911	.633		7.070	7.105
2015	20.673	.717	6.762	6.924	.637		7.078	7.109
2016	20.792	.724	6.752	6.938	.639		7.087	7.113
2017	20.911	.729	6.784	6.952	.641		7.095	7.116
2018	21.030	.733	6.784	6.966	.642		7.103	7.120
2019	21.149	.736	6.808	6.980	.643		7.112	7.124
2020	21.268	.740	6.813	6.994	.643		7.120	7.128

In the context of the variables already in the model, SET scores did not contribute significantly to predicting mean GPA. However, because the university administration has already made a decision to replace the current SET instrument, these predictions would not have been useful in the future.

The model to predict the mean GPA for the ith college group, j^{th} course level, k^{th} semester, for 2014 to 2020 is given by the following:

$$\widehat{\text{gpa}}_{ijk}(t_{\text{new}}) = \hat{\alpha}_{ijk} + \widehat{\text{bs}}_{ij}(t_{\text{new}}) + \hat{\beta}_1 \widehat{\text{AP}}(t_{\text{new}})$$
$$+ \hat{\beta}_2 \widehat{\text{facultyresearch}}_i(t_{\text{new}}) + \hat{\beta}_1 \widehat{\text{SET}}_{ij}(t_{\text{new}}) + \hat{\gamma}_{ijk} + \hat{\theta}_{ij} \text{I}$$

where the current GPA policy and the effect of year continue because the B-splines are linear for this period and the 'hats' on the parameters denote the estimated regression coefficients.

As previously reported in Table 8, the faculty activity index has a slightly negative effect on mean GPA, although it is not statistically significant. This negative relationship indicates that as faculty research activity increases, the mean GPA tends to decrease.

In contrast, the regression coefficient for mean AP credits is positive but smaller in magnitude, and it is statistically significant because it has a much smaller standard error. This indicates that as the average number of AP credits brought in by entering freshmen increases, the mean GPA will likely increase slightly.

Figure 4 displays the extrapolated trend for upper- and lower-division courses in colleges that use mastery grading and in colleges that use a normative approach. Predicted values show that the mean GPA of most categories will likely remain stable, with a continued upward trend of mean GPA in upper division mastery courses. The predicted downward trend in lower division mastery courses must be interpreted with caution. The model shows that prior to the policy change and interim period, these grades had a slightly downward trend. Whether that downward trend will continue or whether the policy change will have a permanent affect remains to be seen.
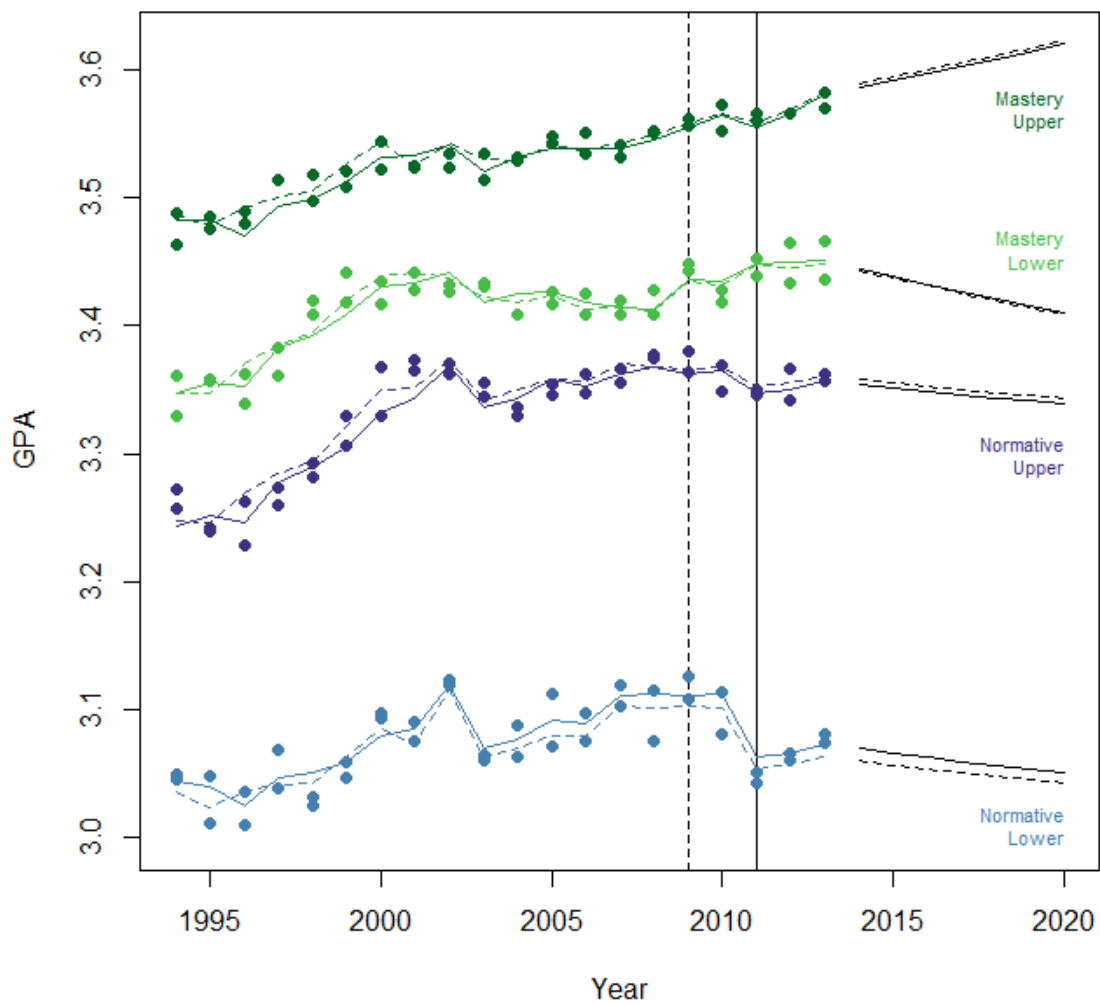
Figure 4. Forecasted mean GPA trends 2015-2020.

CHAPTER 5: DISCUSSION

Much of the published research on grade inflation focuses on the presumed causes of the inflation and the assertion of blame. Faculty are assumed to have buckled under societal and student pressures to award higher grades than students deserve. Sometimes, other factors, such as institutional policies and changes in the quality of students across years (e.g., ACT scores), are considered as possible contributing variables, but the results of those studies do not appear to be newsworthy enough to contribute significantly to the discussion of grade inflation in the media. Researchers who claim that rising grades could be the result of actual student learning are rarely given any airtime at all with the public press. The widely accepted opinion seems to be that average grades are steadily increasing nationwide without a corresponding increase in student achievement.

Prior studies rarely give a thorough description of the study data, as was pointed out in Chapter 2. Researchers studying grade inflation must be more explicit in describing the characteristics of the data used in their analyses, especially when they are drawing conclusions from sample data to larger populations. In this study, by contrast, we attempted to clearly define each of the variables used in the analysis, including the course and academic units included and excluded and the time period studied. We also explicitly described the method used to analyze the grade trends. This study is not intended to be a statement about nationwide grading trends, but administrators at other universities may wish to use similar analytical procedures to investigate grade trends at their own institutions.

Prior research has demonstrated that students in lower-division courses tend to receive lower mean grades than students in upper-division courses (Compton & Metheny, 2000; Creech & Sweeder, 2012; Grove & Wasserman, 2004; Jewell & McPherson, 2012; Sonner, 2000). The results from this study confirmed this prior research and showed evidence of this difference in

every college grading classification. Additionally, we found that the difference in mean GPA between upper- and lower-division courses differs between college grading categories and is greatest within those colleges that tend to use a normative grading philosophy.

The literature directs public attention to certain types of colleges and either implies or explicitly states that those few colleges tend to impact the overall GPA for the rest of the university or even for the nation. In particular, nursing, education, and humanities colleges have often been blamed by researchers for increasing grades. However, our data show that at BYU, the nursing and education colleges combined account for less than 3% of all grades awarded in the last 20 years (Table 5). Humanities adds only another 13%. The colleges with the greatest impact on mean GPA at BYU are Family and Home and Social Sciences (16.39%) and Religious Education (16.23%).

Only a small number of studies have investigated the impact of university policy on mean GPA scores (Adelman, 2008; Addy & Herring, 1996; Jewell & McPherson, 2013; Marx & Meeler, 2013; Sloop, 1992). This study found evidence that university policy changes affect mean GPAs in some courses. It appears that extending withdrawal deadlines may have slightly increased mean GPA in lower-division mastery courses and that removing the ability to replace a previous grade with a later grade earned by retaking a course slightly decreased mean GPA in lower-division normative courses, although neither of these effects were statistically significant (p = .076 and .077, respectively). Upper-division courses were not significantly impacted by the university policy change.

This study may be the largest publically available study of longitudinal trends in grades at a single university. Over 6.5 million grades given by thousands of faculty in ten colleges and schools over 20 years were analyzed. Unique to this study is a new model that includes variables not typically considered in previous studies. Also, the use of splines to model yearly trends has not been reported in previously published studies of grade inflation.

Future Research Recommendations

This study found that the fall 2011 grading policy change at BYU impacted lower-division courses differently depending on the college grading philosophy. The interaction of the policy change and grading practices within each of these colleges may have differing impacts on student GPAs. For example, some students and faculty have reported that some instructors in normative-grading colleges withhold grade information from the students until the withdrawal deadline has passed. If practices like this are occurring, how many students in these types of courses have not withdrawn from the course, but have given up, stopped coming to class, and consigned themselves to failing? It would be interesting to see what the mean grades in these courses would look like if the failing grades from this type of student were not included in the class grading distribution. Future studies should investigate this question.

Along the same lines, future research could investigate advising practices in lower-level mastery classes to determine whether students who are struggling to learn the material are being advised to withdraw from the course, instead of persisting and earning less than an A. This investigation might also show why courses in this category experienced a small increase in mean GPA during the two-year interim period.

One surprising finding of this study was that SET scores were highly positively correlated with college grading philosophy and course level, regardless of the mean GPA of each group. Grading philosophy may be a driving factor in student evaluations of teaching, and this interaction should be studied in further detail. However, Brigham Young University is in the process of moving to a new SET instrument, which may provide different effect results in future studies.

This study found that differences between the mean GPAs of lower-division courses and upper-division courses are not uniform between colleges that rely on different grading

philosophies. Normative upper- and lower-division courses have the largest difference in their mean GPA scores as compared to the other college groups. This is an interesting finding and could be the result of different grading practices between the upper- and lower-division courses. This difference in mean GPA should be investigated further and might also show why normative lower-division courses have a statistically significantly lower mean GPA in winter semesters than in fall semesters.

Future research should be conducted in each of the colleges and could follow the precedent set in this study. Assumptions were made when the colleges were classified by grading philosophy. In particular, colleges in the other category were not analyzed at length in this study, because they were so different from one another, even though they comprised 37.41% of the total grades awarded (Table 5). Colleges and schools could follow the example set in this study by investigating their own college, using grading philosophy groupings for their departments. Departments could likewise utilize this model to study differences in grading trends between the various courses they offer. While this method of grouping may not be possible at the college or department level, it simplifies the analysis.

Recommendations for Practice

Each college or school will need to consider for itself what the findings of this study means to them and what existing practices or policies, if any, should be evaluated. However, it is clear that when cumulative mean GPA is reported for an entire college, a deeper understanding of those scores and what they are composed of is needed. Perhaps the mean GPA should be separated by course level and reported separately. As shown in Table 4, some colleges teach more lower-division than upper-division student credit hours (the Physical and Mathematical Sciences Department teaches three times as many lower-division student credit hours as they do

upper-division student credit hours), while others teach mainly upper-division student credit hours (the School of Education teaches over five times as many upper-division student credit hours as they do lower-division student credit hours). These colleges represent the extremes, but if a college teaches mainly lower-division student credit hours, its reported mean GPA will be comprised of mainly student credit hours that generally have low mean GPA. Conversely, if a college teaches mainly upper division student credit hours, the mean GPA reported will be comprised of upper-division student credit hours, which tend to have high mean GPA.

This study is not intended to promote one type of grading philosophy over another. Each discipline must utilize the grading philosophy that its practitioners believe is the most appropriate for their courses. However, the impact of that grading philosophy on individual students should be considered. If the goal is to help as many students as possible to achieve a specific level of accomplishment, some grading practices may become a hindrance to learning. It is difficult for students to engage in learning activities collaboratively while also competing for grades — those two goals conflict with one another. Also, instructors who feel pressured to follow a certain standard for grading may display behavior that is counterproductive to student learning. Student learning should be the primary goal of any university.

So, does grade inflation exist at BYU? The results of this study show that there is not a simple answer to that question. Grade trends vary between colleges with differing grading philosophies. They also likely vary across departments within colleges and from course to course within departments. Trends also differ between course level. Except for the effect of the policy change, mean GPA trends across most categories at the university have levelled off for more than a decade and are likely to remain so. Study results indicate there is no reason for alarm and that no systemic, rampant pattern of grade inflation is evident.

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Appendix A

The form used to collect Student evaluations of teaching (SET) at BYU has changed four times over the last 20 years. For the purposes of this study, only the response data to the overall instructor question were utilized, although the SET instruments included additional questions related to the course and instructor. Prior to fall 1996, no uniform university data were recorded. From fall semester 1996 through fall semester 2002, all university courses were surveyed each semester via a standard university-wide survey. That survey is labelled in this study as SET Overall Instructor – paper. This paper questionnaire was given to each student during a class period near the end of the semester. The professor was instructed to leave the room, and a teaching assistant or another student collected the completed surveys into a manila envelope and delivered them to the Testing Center for scanning. Data for each question were reported on a 7-point Likert scale.

Since fall semester 2002, the survey has been administered electronically. Two weeks prior to the end of the semester, students are emailed a link to complete an online survey for each of their courses. Data for the online questions are reported on an 8-point Likert scale, labelled in this study as SET Overall Instructor – 8 point good. During the period of fall semester 2003 to winter semester 2007, the response options for two questions (OI and OC) were modified from the 2003 version of the survey, labelled in this study as SET Overall Instructor – 8 point unbalanced. In winter 2007, the labels reverted back to the 2003 version of the survey, labelled in this study as SET Overall Instructor – 8 point good current.

SET Overall Instructor – paper
- Used fall semester 1994 – summer term 2002 (8 years)
- Printed questionnaire administered and collected during class time
- "Rate the course and the instructor as independently as possible. When you rate one try not to think about the other.
  1. Very Poor
  2. Poor
  3. Fair
  4. Good
  5. Very Good
  6. Excellent
  7. Exceptional"

SET Overall Instructor – 8 point good
- Used fall semester 2002 – summer term 2003 (1 year)
- Online survey taken by the student at any point in the last few weeks of the semester
- "Comparing this course with other university courses you have taken, please indicate an OVERALL rating for the following instructor:
  1. Exceptionally Poor
  2. Very Poor
  3. Poor
  4. Somewhat Poor
  5. Somewhat Good
  6. Good
  7. Very Good
  8. Exceptionally Good"

SET Overall Instructor – 8 point unbalanced

- Used fall semester 2003 – winter semester 2007 (almost 4 years)
- Online survey taken by the student at any point in the last few weeks of the semester
- The response categories were revised to represent an unbalanced continuum in hopes of obtaining a less skewed distribution.
- "Comparing this course with other university courses you have taken, please indicate an OVERALL rating for the following instructor:
  1. Very Poor
  2. Poor
  3. Somewhat Poor
  4. Fair
  5. Good
  6. Very Good
  7. Excellent
  8. Exceptional"

SET Overall Instructor – 8 point good current

- Used spring term 2007 – winter semester 2014 (7 years)
- Online survey taken by the student at any point in the last few weeks of the semester
- Previously used 8 point good scale was reinstated
- "Comparing this course with other university courses you have taken, please indicate an OVERALL rating for the following instructor:
  1. Exceptionally Poor
  2. Very Poor
  3. Poor
  4. Somewhat Poor
  5. Somewhat Good
  6. Good
  7. Very Good
  8. Exceptionally Good"