GROWTH MINDSET DEVELOPMENT:

EXAMINING THE IMPACT OF A STANDARDS-BASED GRADING MODEL ON MIDDLE SCHOOL STUDENTS' MINDSET CHARACTERISTICS

by

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DEDICATION

To my grandmother, Mary Rebecca (Wren) Small
A constant inspiration and reminder of the importance of higher education, even in 1916

To my daughter, Katherine Marie Franklin, born during this journey
May you never, ever doubt all you are capable of achieving in this world

To strong, intelligent women
May we know them
May we be them
May we raise them

ABSTRACT

As the grading reform movement continues to challenge traditional grading practices, standards-based grading has emerged as a viable alternative model. However, many oppose the change as it requires a philosophical shift and overhaul of the grading system. Given the continuing debate and lack of empirical evidence regarding the effectiveness of standards-based grading models, research is needed to explore student outcomes from a standards-based grading model and whether this model may promote growth mindset development.

The framework of this study is based on Dweck's theory of fixed versus growth mindset, which has been extensively researched and shown to have significant impacts on student learning. The purposes of this study were to identify differences in students' mindset characteristics based on grading model (standards-based grading vs. traditional grading practices) and determine the extent to which the grading model contributes to predicting students' growth mindset development. This study uses a quantitative approach and survey research methodology. Participants were 423 seventh grade students from two middle schools, one school using traditional grading and the other standards-based grading. Six mindset characteristic constructs were identified via factor analysis – growth mindset praise, fixed mindset praise, growth mindset effort in reading, growth mindset effort in math, growth mindset goal setting, and fixed mindset views on failure.

Independent samples *t*-tests indicated students from a standards-based grading model demonstrated significantly more growth mindset characteristics in the areas of effort in math, belief about intelligence, and goal setting. Hierarchical regression analysis confirmed belief about intelligence, praise, and gender to be significant predictors of mindset characteristics with grading model also being a predictor for the mindset characteristics of effort in math.

CHAPTER 1

INTRODUCTION

"*The first step in sound classroom assessment practices associated with grading is to ensure that grades are meaningful… Ultimately, grading and reporting are important tools for what matters most: improving student learning."*

- *Muñoz and Guskey* (2015)

In an age of accountability and reform, schools are continually looking to improve their practices. Yet, the list of possible initiatives that claim to increase student learning is constantly expanding. In the quest for increased student achievement, school leaders are faced with a choice of which new models will have the largest impact on students' learning. Hattie (2009) has used meta-analysis to quantify the influence of individual interventions on student learning. Yet, his results indicate that some of the most commonly implemented models sometimes have the smallest effect size. Therefore, school leaders must make educated decisions regarding whether or not the cost of executing change is worth the human and monetary investment based on the resulting impact on student achievement.

One area into which school leaders are investing significant time and energy is grade reform in the hopes that increased communication of student learning will create awareness, feedback, self-assessment, and motivation for student growth. In response to concerns regarding accuracy and usefulness of traditional grades, many districts are making the shift to alternative grading models such as standards-based grading. The principles of standards-based grading are clear targets for learning, opportunities for reassessment to show growth over time, and a focus on separating learning and behavioral elements when reporting in order for an academic grade to truly represent what students understand and can do (Marzano, 2000; Muñoz & Guskey, 2015;

Wormeli, 2006b). However, a shift in grading models can be a significant cultural change for a school district due to the fact that traditional grading models have been in place for the past century (Guskey, 1994). Yet, school leaders have little empirical evidence to support their decisions when parents and community members question practicality of the change (Brookhart, 2011b). Legislation such as *Race to the Top* (U.S. Department of Education, 2016) and *No Child Left Behind* (Education, 2016) are creating growing pressure for school leaders to increase student achievement and explore innovative ideas, while still being held accountable to multiple stakeholder groups who may be resistant to the change required when switching to a standards-based grading model.

Statement of the Problem

Assessment reform has become a highly controversial discussion in the "No Child Left Behind" era of increased rigor, relevance, and accountability. Popham and Husek (1969) began the discussion on assessment reform by calling for a shift from norm-referenced to criterion-referenced assessments, and Stiggins (1991) continued this call with the claim that education is entering an entirely new era of assessment. Despite these early appeals for reform, current standardized assessments show the majority of students are not meeting the established criteria. According to the most recent national NAEP Assessment (2013), a mere 35% of 8th grade public school students are proficient in reading and only 34% in mathematics. Significant work still needs to be done in order to increase student achievement in the United States.

Obtaining an accurate measure of student achievement all depends on assessment practices. Teachers have multiple views on the best assessment practices, with numerous studies showing that what teachers feel should factor into a grade varies within the profession (Bonner & Chen, 2009; Cox, 2011; Randall & Engelhard, 2009). In addition, studies have shown that

parents and teachers do not interpret the same report card in the same fashion (Munk & Bursuck, 2001; Waltman & Frisbie, 1994). The intended meaning of the grade by teachers is not always what parents receive. This miscommunication can lead to a multitude of misunderstandings that can be detrimental to the learning process. Communicating learning progress to parents in a format that accurately reflects the intended meaning of the grade is a challenge faced by educators and a fundamental principle of the grading reform movement.

Part of the communication confusion stems from the inherent flaws within the traditional grading system. For example, educators have historically considered grades to be a motivational tool in measuring students' learning progress (Marzano, 2000). However, when teachers include behavioral factors such as attendance, participation, effort, and attitude, they are taking the focus away from academic learning and instead on behavioral compliance (Tomlinson, 2001; Winger, 2005). In fact, many experts in the field have come to the conclusion that including behavioral elements in a grade actually does more to demotivate than motivate students (Guskey, 2011; Stiggins, 2004; Tomlinson, 2001; Wormeli, 2011). Other traditional grading methods such as including zeros for missing assignments mathematically skews the grade much more than teachers often intend (Connor & Wormeli, 2011; Reeves, 2004; Wormeli, 2011). The refusal of retakes and redos does not honor student growth in the learning process but instead limits learning to a particular point in time where the final grade on the report card does not truly represent student learning by the end of the marking period (Guskey, 2011; Wormeli, 2011). The alternative approaches to these traditional grading practices all require a philosophical shift in the purpose of grading. This requires shifting how, when, and why grades are earned. Until these aspects of grade reform are identified, it will be impossible for grades to act as a clear and accurate representation of student learning.

In an effort to put the focus back on student learning, traditional grading models are being called into question (Brookhart, 2011b; Marzano & Heflebower, 2011; Muñoz & Guskey, 2015; Winger, 2005), and as education reform continues, alternative grading practices such as standards-based grading are being adopted in schools across the country. With standards-based grading, students' progress is constantly being measured against a pre-determined standard with only the most recent score being reported, rather than an average of students' progress at different stages as with traditional grading. In addition, standards-based grading separates academic standards from behavior standards. Because it focuses on academic mastery, the academic grade does not include behavior elements present in traditional grading such as participation, homework completion, or extra credit (Iamarino, 2014). Schools currently implementing these alternative-grading models cite multiple examples of its superiority over traditional grading. Proponents argue alternative grading practices allow for purposeful feedback, student ownership, differentiation, and assessment *for* learning rather than of learning (Scriffiny, 2008; Stiggins, 2009; Tomlinson, 2001; Wormeli, 2006a). Furthermore, proponents claim standards-based grading addresses the call for meaningful grades that accurately communicate progress to students and parents. By removing extra credit, allowing redos and retakes, and separating behavior from the academic grade, standards-based grading provides a more accurate snapshot of student learning compared to traditional grading models (Marzano & Heflebower, 2011; Tomlinson, 2001; Wormeli, 2011).

An additional advantage to alternative grading practices is that they better align to today's criterion-referenced standardized assessments since both are "concerned with how well a student performance is relative to a prescribed set of content standards rather than relative to a norm group" (Wang & Brown, 2006, p. 311). There is an increasing focus on high-stakes,

standardized testing as a measure of accountability for both teachers and students. Yet, many contend classroom grading practices more accurately reflect the day-to-day progress of the student and dismiss the standardized test as only a single snapshot in time. Stiggins (2004) supports this when he discusses the ability of standardized assessments to be an assessment *of* learning (student mastery), while alternative grading practices in the classroom have the ability to act as a formative assessment *for* learning, informing future instructional decisions for students.

Given the many debates regarding assessment reform, standards-based grading and other alternative grading methods are still seen as contentious topics not only within entire school communities but amongst staff themselves (Brookhart, 2011b; Reeves, 2011). A concern with moving to alternative grading practices is the lack of history and empirical evidence supporting the mindset behind the grading model. Many studies have shown that standards-based *teaching* practices correlate to higher academic achievement (Post, 2014; Schoen, Cebulla, Finn, & Fi, 2003). However, there is little empirical evidence at the secondary level exploring the implementation of standards-based grading practices. Critics question potential impacts of large-scale implementation of standards-based grading and express concerns regarding the dissemination of a fixed curriculum, poor execution, and lack of fidelity to the model (Baines & Stanley, 2006; Thompson, 2001; Tomlinson, 2000). A concern with researching standards-based grading is the fact that every school has the autonomy to execute their grading model in their own unique way. However, in the end, the philosophical tenants behind any well-implemented standards-based grading model should be the same: grades focused on learning, frequent and specific feedback, and multiple opportunities for growth (Guskey, 2001; Marzano, 2000; O'Connor & Wormeli, 2011).

The philosophy behind standards-based grading directly correlates with Carol Dweck's decades of work on implicit theories of intelligence. According to Dweck (2015), individuals can adopt an entity theory of intelligence, believing their abilities are fixed and predetermined, or an incremental theory, believing that they can improve through effort and persistence. More recent literature has seen a shift in terminology. Since current research has expanded into multiple professional fields, terminology now classifies an entity theory of intelligence as a fixed mindset and an incremental theory as a growth mindset. Researchers have collected a wide range of evidence to support the claim that a growth mindset leads to greater academic success due to its focus on mastery during the learning process (Blackwell, Trzesniewski, & Dweck, 2007; Henderson & Dweck, 1991; Mangels, Butterfield, Lamb, Good, & Dweck, 2006; Molden & Dweck, 2006).

Because both standards-based grading and mindset focus on assessment *for* learning rather than of learning, both have a mastery-oriented approach and are contingent on application of feedback, self-regulated effort, and individual learning goals (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013; Dweck & Leggett, 1988; Rick Stiggins, 2009). While standards-based grading is a relatively new topic for empirical study, researchers have decades of evidence citing the ways in which a growth mindset leads to increased student learning. Research has shown that those with a growth mindset show a diverse range of coping strategies, willingness to take on challenges, increased effort, persistence, self-monitoring, and positive learning trajectory over time (Blackwell et al., 2007; Diener & Dweck, 1978; Dweck, 1975; Henderson & Dweck, 1991; Hong, Dweck, Lin, & Wan, 1999). These learning outcomes embody the ideals of both a growth mindset and standards-based grading.

Alternative grading models and implicit theories of intelligence are receiving increased attention in today's schools as strategies to put the focus back on student learning. Therefore, there is an expectation that implementing these innovative models will correlate with increased learning in the classroom and, thus, increased student achievement on criterion-referenced standardized assessment scores. Still, there is little evidence to link standards-based grading models with an incremental mindset or criterion-referenced standardized assessment scores at the secondary level. While it is known that adopting a growth mindset leads to greater student learning (Doron, Stephan, Boiché, & Le Scanff, 2009; Romero, Master, Paunesku, Dweck, & Gross, 2014), it is unknown the extent to which students with a standards-based grading model adopt a growth mindset. Previous studies have shown only a modest correlation between traditional teacher-assigned grades and high stakes test scores (Conley, 2000; Wenz-Gross, Brennan, Kim, & Siperstein, 2001). Given the continuing debate and lack of empirical evidence regarding the effectiveness of alternative grading models, more information is needed in the area of standards-based grading implementation at the secondary level in order to assess whether it directly leads to increased student achievement compared to traditional grading and identify if standards-based grading helps to promote an implicit theory of intelligence (i.e., growth mindset).

Purpose of the Study

The purpose of this study was to add to the research specifically in the area of standards-based grading and growth mindset to determine whether grading model has an influence on student mindset or belief about intelligence.

Research Questions

The following research questions were addressed in this study:

1. What are the background characteristics of middle school students who participated in this study?
2. To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' mindset characteristics based on a) effort in reading, b) effort in math, c) goal setting, d) views on failure, and e) belief about intelligence?
3. To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' response to a) growth mindset praise, and b) fixed mindset praise?
4. To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a growth mindset responses for a) effort in reading, b) effort in math, and c) goal setting?
5. To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a fixed mindset response to failure and mistakes?

Significance of the Study

A study on the connection between standards-based grading, mindset, and student achievement is important to the work of teachers and school leaders. Understanding the relationship between these elements can inform and improve the implementation of alternative grading models. Many communities are opposed to a shift to standards-based grading as it can

require an overhaul of the grade reporting system (Erickson, 2011; Townsley, 2014). Most parents, teachers, and administrators have grown up within a traditional grading system and resist change due to a lack of understanding and verification of its effectiveness (Marzano, 2000). However, if empirical evidence shows a grading shift is connected to growth mindset, a concept already shown to have a positive impact on student achievement (Blackwell et al., 2007; Dweck, 2006; Molden & Dweck, 2006; Romero et al., 2014), these results can provide evidence school leaders can use to support their decision to embrace grading reform.

This study also adds to the body of research regarding standards-based grading and implicit theories of intelligence. Results can clarify any possible connections between assessment practices and student mindset. By understanding possible connections between a standards-based grading model and student mindset, educators can better understand its impact on student learning. Results of this study provide additional evidence to determine whether a standards-based grading model supports development of a growth mindset, and whether this combination leads to increased student achievement. Teachers and school leaders are investing time, money, and effort into professional development regarding mindset and alternative grading models (Guskey, Swan, & Jung, 2010). The results of this study help school leaders better understand the impact of these decisions on student learning and assist them in their decisions regarding professional development and district initiatives. For example, districts can save a significant amount of time and effort by implementing classroom training on growth mindset rather than overhauling their entire grading system. Therefore, results can help teachers and school leaders better understand the impact of their initiatives on student achievement.

Conceptual Framework

According to Miles, Huberman, and Saldaña (2014), a conceptual framework "explains, either graphically or in narrative form, the main things to be studied – the key factors, variables, or constructs – and the presumed interrelationships among them" (p. 20). Creswell (2014) maintains this belief with the claim that theories in quantitative research seek to "specify the relationship among variables" (p. 54). By using theory, the researcher can better explain how and why one variable may predict another.

Tollefson (2000) claims motivational theory stems from the proposition that "people try to bring order into their lives by developing personal, sometimes called implicit, theories about why things happen as they do in their lives" (p. 64). Because these motivating beliefs are implicit, they may not even be yet articulated in the mind of the individual (Burnette et al., 2013). The framework for this study was based upon Carol Dweck's implicit theories of intelligence. More recently referred to as "mindset," implicit theories of intelligence have been widely studied as a means to classify individuals' motivation and their self-theories regarding the potential growth of their abilities (Ames, 1984; Blackwell et al., 2007; Dweck, 1975, 2015; Dweck & Leggett, 1988; Dweck & Reppucci, 1973; Henderson & Dweck, 1991). The theory of mindset creates two categories: entity theory, now known as a "fixed" mindset, and incremental theory, now known as a "growth" mindset (Dweck & Leggett, 1988). Each mindset carries with it a set of beliefs regarding intelligence and learning. In this study, student mindset was an independent variable measured via a survey instrument, the purpose being to determine whether the participant holds a fixed or growth mindset.

Fixed Mindset

When students have a fixed mindset, they see human abilities as invariant regardless of personal development (Molden & Dweck, 2006). According to Dweck (2015), individuals with this mindset tend to see failure and the need for effort when learning as a result of low intelligence. This fear of failure results in students shying away from the challenge of learning tasks and instead focusing on traditional performance tasks that allow them to maintain proof of their intelligence (Hong et al., 1999). Since a fixed mindset focuses heavily on the end result or grade rather than the learning process, it can lead to one's self-esteem being tied to extrinsic praise and social comparison often present within the traditional grading system (Ames, 1984; Dweck, 2003).

Growth Mindset

In contrast, students with a growth mindset believe abilities can be cultivated over time through hard work. Therefore, they rely heavily on self-monitoring strategies and feedback as a tools to monitor growth toward a goal (Burnette et al., 2013; Yan, Thai, & Bjork, 2014). A growth mindset is cultivated in an environment that allows multiple opportunities for growth and a mastery-oriented approach. Because they see learning as a process that leads to change in their intelligence, studies have found students with a growth mindset to be more resilient over time due to the broad range of strategies they cultivate in regard to goal setting, self-monitoring, and implementing outside feedback. Thus, they show greater growth and achievement over time (Dweck, 2006; Job, Walton, Bernecker, & Dweck, 2015; Molden & Dweck, 2006).

Mindset in this Study

In this study, Dweck's (2015) work on mindset was used as a framework to measure both dependent and independent variables. An electronic survey instrument was used to gather

responses in order to gauge participants' mindsets. However, this research goes deeper than broadly identifying a participant as either having a fixed or growth mindset. Instead, characteristics of mindset (praise, goal setting, effort, and self-esteem/views on failure) are evaluated separately in order to more specifically determine where students fall on a mindset continuum (see Table 1.1).

Table 1.1

Comparison of Fixed and Growth Mindset Characteristics

Fixed Mindset	**Mindset Characteristic**	**Growth Mindset**
Prefers praise of their natural intelligence and ease of performance	Praise	Prefers praise of their effort and hard work
Only takes on challenges in areas of known strength, avoiding true challenges out of fear of revealing lack of skill, giving up easily when challenged	Goal Setting	Embraces challenges with the goal of mastery, motivated by the opportunity to learn something new
Sees effort as an indicator of failure	Effort	Sees effort as a path to mastery
Blames failure on others and becomes discouraged, equating success and failure with personal self-worth	Self-Esteem/ Views on Failure	Sees failure as an area for improvement and opportunity for growth, being motivated to work harder and push through setbacks

This study also sought to identify how these characteristics of mindset factors are influenced by belief about intelligence. Since mindset is often considered to be a product of one's belief about intelligence (Laursen, 2015; Mangels et al., 2006; Sciarretta & Cacciamani, 2012), this study explored the extent to which a student's individual mindset characteristics can be predicted by their belief about intelligence along with the school's grading model.

Definitions of Key Terms and Acronyms

Alternative Grading Model – a model of grading that varies from the traditional grading system of percentages and points, instead focusing on standards and assessment for learning

Criterion-Referenced Assessment – a standardized assessment in which student progress is measured against a pre-determined set of criteria and reported via a standard score

Competency-Based Learning – a model where students advance based on their learning (mastery of skills) rather than time (grade level)

ELL- English Language Learner

Entity Theory of Intelligence or "Fixed Mindset" – a meaning system with a focus on validating performance that believes intelligence to be a trait one is born with that cannot be developed (Dweck, 2003)

Formative Assessment – an assessment given in the middle of a unit meant to inform instruction

Free and Reduced Lunch – students who can receive free or reduced price lunch at school based on family income eligibility guidelines

Incremental Theory of Intelligence or "Growth Mindset" – a meaning system with a focus on the learning process that believes intelligence to be malleable via effort (Dweck, 2003)

Intelligence – the skilled use of reason or abstract thinking to apply knowledge to one's environment

Implicit Theories of Intelligence – one's personal, schematic beliefs regarding the nature of intelligence (either fixed or growth mindset) (Burnette et al., 2013)

Middle School – students in grades 6 through 8

Norm-Referenced Assessment – a standardized assessment in which students' score is determined via a comparison of their performance against their peers

SBG – standards-based grading

SPED – special education

Standardized Assessment – an assessment in which the manner of administration and scoring is consistent across all testing environments (students complete the same assessment and results are analyzed in the exact same way)

Summative Assessment – an assessment delivered at the end of a unit of study

Standards-based Grading – an alternative model of grading which removes extra credit, participation, homework completion, and behavior, and instead represents students' most recent progress toward a pre-determined standard (Wormeli, 2006b)

TAG – talented and gifted

Traditional Grading – a model of grading in which students receive an A, B, C, D, or F grade dependent on a percentage calculated based on a combination of factors such as behavior, participation, extra credit, homework, and assessments (Wormeli, 2006b)

Summary

The purpose of this study was to inform policy makers, school administrators, and teachers interested in grading reform by identifying the relationship between standards-based grading, implicit theories of intelligence, and student achievement. Specifically, the study aimed to identify any connections between standards-based grading and incremental theories of intelligence to determine if these variables positively influence student learning.

CHAPTER 2

LITERATURE REVIEW

In 1969, Popham and Husek called for student achievement to be measured by determining student ability against a predetermined standard rather than determining ability by comparing one student to another with a traditional bell curve. Assessing pre-set standards of learning or "criteria" is the basis of a criterion-referenced assessment. By advocating for criterion-referenced assessments, Popham and Husek were supporting students focusing on their own personal mastery of the content rather than on each other. Soon after, Dweck (1975) found students who continually persisted when faced with challenging learning tasks attributed progress toward individual effort (growth mindset). While these two concepts have been extensively researched for decades, little examination has been conducted regarding the connection between alternative grading practices and student mindset in the area of student achievement. This chapter provides a literature review on standards-based grading and mindset, starting with a history of traditional grading. Following sections review concerns about traditional grading, modern grade reform, and connections to motivation, and the influence of mindset.

Origins of Traditional Grading Practices

In order to understand the need for grading reform, it is important to understand the history of grading. Education and grading have come in many forms across time. Prior to the 1850's, the concept of grading or report cards was unknown as students were clustered in one room schoolhouses (Guskey, 1994). Assessment and progress monitoring feedback consisted solely of teachers listing skills students had attained as they increased in age.

Moving beyond the one room schoolhouse, the traditional, Americanized approach to education by grade level began in the 1920's with the onset of an assembly-line approach to school organization (Stiggins, 1991). Categorization and quantification became increasingly important. During this era, points and percentages began being used to communicate student learning on a numeric scale. Categories were also created to simplify communication with excellent, good, average, poor, and failing corresponding to A, B C, D, and F letter grades (Johnson, 1918). Use of these letters as traditional grading categories continued for almost 100 years and into the 21st century.

Taking letter grades one step further, another grading approach implemented during the 1920's was grading on a curve (Guskey, 1994). In this model, the number of students who receive each letter grade was capped at a certain percentage. For example, only 6% of students get an A, 22% a B, 44% a C, 22% a D, and 6% an F. When plotted on a graph, these quantities create a bell curve shape which gave the model its name (Corey, 1930). These percentage caps also perpetuated the mentality of a C being average. The logic behind the approach of grading on a curve stemmed from the idea that student intelligence mimics a normal probability curve (Guskey, 1994).

This "assembly-line" method of education was embodied with a "Cartesian" or "positivist" approach to epistemology via lecture and objective assessment (Anderson, 1998, p. 6). Such assessments were used to determine learning and, thus, student grades. For the next 60 years, paper and pencil assessments would be the focus of determining student learning in the name of "equality," eventually leading to the introduction of psychometric research and a movement toward centralized testing programs (Anderson, 1998). This movement led to a very specific pattern of behavior wherein the responsibility for assessment development was left to

the textbook publisher. It was the role of the teacher to make the achievement targets fit the assessment (Stiggins, 1991). These assessments were then determinants of a student's letter grade.

A historical focus on standardized assessment has led to what Wormeli (2011) refers to as "conveyor belt learning," in which students have a single opportunity to demonstrate their knowledge. However, some in education have now begun to question whether or not these traditional assessment and reporting methods truly fulfill their purpose. Only recently are educational professionals beginning to take note and call for reform via alternative grading practices.

Flaws in Traditional Grading

While use of a single letter or number as a lone indicator of success has existed for decades, there are many concerns with the traditional letter grading system used in the United States. Each of the flaws described below creates an inaccuracy that harms the validity of the traditional percentage or letter grade. While they may appear insignificant individually, their collective impact is what motivates the grading reform movement.

Grades as Comparison

Multiple researchers have documented traditional grading and standardized assessment supporters as being proponents of a normal bell curve, class standing, and talent determination (Guskey, 2011; Stiggins, 2004, 2005; Winger, 2005). As noted earlier, the practice of grading on a curve started in the 1920's and became commonly used in the 1930's in an effort to create more objective scoring (Guskey, 1994). Guskey (2011) explains the historical reasoning: "If scores on intelligence tests tend to resemble a normal bell-shaped curve – and intelligence is clearly related to achievement – then grade distribution should be similar" (p. 18). However,

Guskey then notes that this normal distribution relies on randomization and no intervention. In contrast, teaching in and of itself is an intentional intervention that would skew any normal distribution. Thus, forcing grading on a curve becomes mathematically inaccurate and solely a tool for ranking students. By creating a normal bell curve, the purpose of the grade becomes a tool of comparison within a group (Marzano, 2000). All students may have shown proficiency of the material, yet some receive a significantly lower grade due to the mathematical curve. Thus, the grade is no longer truly representative of their learning (Guskey, 2011).

Volwerk and Tindal (2012) argue that the use of traditional grade point averages does not accurately summarize performance. Rather, it creates disproportionality between A grades and lower letter grades, which leads to a gap between "high achieving" and "low achieving" students, especially when used to determine class rank. Yet, grade point averages act as social capital since they are culturally considered an indicator of success (Brookhart, 1994). This relates back to the cultural concern of grades as a tool to determine the successful and the unsuccessful through comparison rather than an accurate report of their personal learning.

Omnibus, Hodgepodge Grading

Another concern with traditional grading is that there is no valid, consistent meaning to the letter grades. A single letter next to a content area does not communicate what specific content the student has mastered nor where they are at with an individual skill (Guskey, 2011). Multiple factors go into a single letter grade such as homework, quizzes, projects, and tests. Yet, studies have shown there is no conformity or agreement amongst teachers regarding which of these assessment elements should be included or to what degree (Bonner & Chen, 2009; Randall & Engelhard, 2009; Sadler, 2009). Guskey (2006) refers to this as "hodgepodge grading," in which multiple pieces of evidence are included in a single letter grade causing significant issues

with variation and validity. Marzano and Heflebower (2011) claim this "omnibus" grade has absolutely no meaning outside of cultural constructs of A being success and F being failure. In this way, traditional grading again becomes a method of categorizing and labeling rather than supporting learning growth.

A further concern with the omnibus grade is the fact that it does not acknowledge when new learning has taken place. Connor and Wormeli (2011) explain how a student could earn an F on the chapter quiz, but an A on the final test. This final A would show the student has ultimately mastered the material. However, with an omnibus grade the two scores would average into a significantly lower grade on the final report card. This final grade would be an inaccurate representation of the student's learning.

Assessing Behavior

In addition to the concerns with a single grade accurately measuring student learning, traditional grades have incorporated multiple behavior factors into the final grade, such as homework, effort, attendance, and attitude, all of which have no place in an academic grade report (Guskey, 1994; Marzano & Heflebower, 2011; Scott, 2005; Scriffiny, 2008; Stiggins, 2004; Winger, 2005; Wormeli, 2006). Connor and Wormeli (2011) argue that by assessing on these nonacademic factors we are reporting on the methods for achieving the learning rather than the outcome of the learning itself. In reality, a student may have mastered the material but arrives late to class. A student may have completed the independent practice perfectly but forgets it at home. A student may not take notes and receive a low participation grade, when in reality that student may be able to master the material without needing to take notes. While these instances are concerns that should be assessed, they are behavioral concerns, not learning concerns. Regardless of the behavior, the student has met the academic learning target. Point deductions

for behavioral elements such as missing class, turning work in late, or poor attitude skew the academic grade as they assess behavior rather than learning in a failed effort to maintain control (Wormeli, 2006a). Tomlinson (2001) writes, "Grading, as we typically practice it, is more about charting circumstances of student birth and experience than it is about documenting growth. It is more about control than empowerment" (p. 14). Grading assessment that includes behavior creates a culture of compliance rather than a culture of learning (Cox, 2011; Sadler, 2009).

Grades as Motivation

Creating a culture of compliance was seen as helpful in a traditional grading system because of its perceived ability to influence student behavior (Wormeli, 2006a). Historically, assessment and grading were assumed to act as motivators for students. Winger (2005) reflects, "I recall telling my students, 'Work hard and your grade will be fine.' Although I did not realize it, the message to students was clear: My unconscious curriculum was one of compliance" (p. 62). Grades have also provided either positive or negative recognition that was meant to spur a change in student behavior (Guskey, 2011). If a student received a high grade, the intent was to illicit feelings of pride and accomplishment, while low grades were meant to illicit shame in the hopes of the student now being motivated to try harder next time.

However, Wormeli (2011) counters that "in reality, these practices have the opposite effect: They retard student achievement and maturation" (p. 22). Using grades as a motivator has been highlighted for several years as a concern regarding the purpose of grading (Guskey, 2011; Stiggins, 2004, 2005; Winger, 2005; Wormeli, 2011). When using grades as a motivator, the teacher ends up polarizing students. Some become frustrated and lash out or withdraw when they repeatedly do poorly (Guskey, 2011). Others may cram to perform solely for the assessment at the end rather than the full learning experience, thus leading to short term rather than long term

knowledge retention (Stiggins, 2005). This can also damage the teacher/student relationship and lead to more behavioral issues within the classroom, a concern it was intended to solve (Wormeli, 2006a).

Including Zeros

Another issue with traditional grades is the use of mathematical averaging, especially in response to missing assignments. In a traditional classroom, a missing assignment would receive a zero. However, this skews the mathematical average to the point where the grade is no longer valid (Guskey, 2013).

> If we're required to average grades, a single missing assignment—a zero—on the 100-point scale disproportionately skews the report: 100 + 100 + 100 + 0 yields an average of 75, whereas a 100 + 100 + 100 + 50 yields an average of 87.5, which is closer to the truth of overall competency if we're aggregating all assessments equally into a single, final grade. (O'Connor & Wormeli, 2011, p. 42)

By using zeros, teachers may demotivate students where they perceive a situation in which they have no mathematical hope of overcoming the low grade. Stiggins (2009) considers it a self-fulfilling prophecy that can follow students over time, impacting not only their self-esteem but their attitudes and behaviors toward learning.

Perceptions on Grading

Each of these flaws within the traditional grading system has contributed to creating confusion regarding student grades for all stakeholders (i.e., teachers, parents, administrators, etc.) within the educational system. Subsequently, each stakeholder group shares a wide range of beliefs and perceptions of the purpose, process, and use of grades.

Teacher Perceptions

McMillan and Nash (2000) found that teachers' internal beliefs and values regarding their personal philosophies of education influence what they feel should go into a grade, which in turn creates tension when it comes to assessment. Findings show this leads to a high level of variation in assessments and grading practices throughout the field of education, even within a single school or grade level. Brookhart (2011b) claims this is no surprise as teachers bring their own personal experiences and attitudes into their grading. These customs have long endured and become difficult habits to break.

Multiple studies confirm that teachers have varied attitudes toward grading practices and that many still hold very traditional views, some without even knowing it (Bonner & Chen, 2009; Cox, 2011; Randall & Engelhard, 2009). Consequently, the field of education is full of subjectivity with each teacher responding based on their own prior experience and philosophical beliefs (Randall & Engelhard, 2009). Studies have shown that "teachers respond idiopathically and unpredictably to contextual factors in their teaching situations" (Bonner & Chen, 2009, p. 74). For example, a study by Bonner and Chen (2009) found significant inconsistency amongst teachers regarding grading practices such as rounding up a grade for a student who has given high effort, waiving late policies, taking off points for disruptive behavior during an exam, or relying on instinct over a test score. This extreme subjectivity severely impacts the accuracy and equity of grading (Cox, 2011).

Recent studies are showing a gradual shift of teachers' attitudes toward grading reform (Cox, 2011; Urich, 2012). These studies show that as teachers see the impacts of assessment *for* learning, their grading practices shift away from including ability, behavior, and effort. Scriffiny (2008) claims as teachers make the shift from traditional to alternative grading practices, they

begin to see the many benefits, such as reduced paperwork, more targeted instruction, and teaching of quality.

Administrator Perceptions

School administrators' beliefs regarding grading practices can have a large influence on school climate because administrators often hold the role of ultimate decision makers. Stiggins (2004) points out that many administrators historically relied on solely standardized assessment data to inform how their students were performing. However, the role of the administrator over time has shifted from being a manager to becoming an instructional leader (DuFour, 2002). Stiggins and Duke (2008) stress the importance of administrators focusing on improving student learning through high competency in the areas of assessment at the classroom level rather than solely at national testing level. Stiggins and Duke claim, "The principal must be a key player in ensuring the accuracy and effective use of evidence of student achievement at the school and classroom level" (p. 286). Being an effective instructional leader requires administrative follow through and active participation in the grade reform process rather than passively moving toward change (Urich, 2012). Carey and Carifio (2012) and Iamarino (2014) all stress the importance of an administrator ensuring all teachers are working toward a common assessment goal in order to avoid grades becoming confusing and disjointed for those not present in the classroom. An administrator is responsible for a building moving forward with grade reform collectively.

From an administrator perspective, students' academic failure can also be a financial burden. When students struggle academically, increased time, resources, and attention are needed from both administration and interventionists in order to avoid failure (Carey & Carifio, 2012; Reeves, 2004). However, a standards-based grading system is a low cost method to offer multiple opportunities to show success, increase student motivation, and provide constant

communication of progress as means to improve student learning (Iamarino, 2014; Marzano & Heflebower, 2011; Rosales, 2013). Thus, increasing academic success through grade reform efforts such as standards-based grading can also be beneficial to administrators financially.

Parent Perceptions

Parents make up another critical stakeholder group in the grading reform discussion. When grades are used to communicate learning, then their primary audience is the parent and the student. However, traditional grading leaves room for significant uncertainty. Waltman and Frisbie (1994, p. 235) label parent/teacher communication via report cards as "muddled," identifying a lack of clarity regarding grade distribution, what goes into a grade, and whether they track status or growth. These misunderstandings can cause a misinterpretation of student learning (Waltman & Frisbie, 1994). For example, if a teacher feels that the "average" grade for the course is a B, but the parent feels it is a C, a grade of B- would be considered below average in the mind of a teacher but above average in the mind of a parent. A student may receive an A on all assessments, but the teacher may factor in late work, participation, and attendance, resulting in a C. By including factors related to behavior, this practices leads to an inaccurate representation and communication to the parent of their child's academic learning. Waltman and Frisbie (1994) found these misunderstandings to be very common in education.

Furthermore, Lubienski (2004) found parents with a higher socioeconomic status and education level were more likely to prefer a standards-based curriculum over traditional when presented with benefits and drawbacks of both. As education level rises, the acceptance of alternative grading practices increases (Lubienski, 2004). When informing parents of their child's learning progress, schools must ensure their method of communicating progress provides clear and accurate information. As schools move toward alternative grading practices, it should

be noted that while much quantitative research has been conducted regarding parent vs. teacher interpretation of traditional grades (Lubienski, 2004; Waltman & Frisbie, 1994; Wong, 2008), there is little to no research analyzing parent interpretation of alternative grading practice. Therefore, it is difficult to determine whether or not alternative grading practices do indeed improve on previous discrepancies regarding parent and teacher perception of grades.

Grading Reform

The multitude of concerns regarding traditional grading practices has culminated in a call for grading reform. Re-clarifying the purpose of grades becomes the first step in the grading reform movement. Across the literature, there is a consensus among educational researchers that the purpose of assessment is to provide accurate, consistent, and meaningful feedback regarding student learning (Connor & Wormeli, 2011; Guskey, 1994; Scriffiny, 2008; Stiggins, 2004; Winger, 2005). Guskey (1994) claims that grades are not necessary in order to teach and learn. They are solely a communicator of progress. However, Stiggins (2004) argues grades on assessments can indeed inform teachers' day-to-day instructional decisions, but only if they are done formatively within the daily classroom setting rather than solely at the end of the marking period. Teachers can use formative grades as information about student progress in order to plan their next instructional steps. Stiggins (2004) also claims decisions *students* make based off these grades and assessments have the biggest impact on learning.

The change in beliefs regarding the purpose of grading is representative of a change in beliefs regarding grades themselves. Contrary to traditional viewpoints, the purpose of grades in an era of reform is not as a punishment or a motivator, not a reflection of behavior or effort, but a measure of academic learning in order to communicate progress to students and parents (Connor & Wormeli, 2011; Guskey, 1994; Scriffiny, 2008; Stiggins, 2004; Winger, 2005). As the

discussion around grade reform grows, there has been an increasing need to clarify the ultimate purpose of grading. According to Muñoz and Guskey (2015), the purpose of grades is to "reflect students' performance on specific learning criteria" (p. 65). Thus, grades can be a tool to communicate current learning progress. A new emphasis can therefore be placed on assessment *for* learning, rather than assessment *of* learning. Stiggins (2004, p. 23) claims assessment for learning is the solution to what he claims to be "a legacy of mistaken beliefs" regarding grading and assessment. He claims the purpose of assessment for learning is to create a balanced system in which multiple stakeholders make frequent and timely use of assessment data to meet individual student needs. Marzano & Heflebower (2011) echo this belief by encouraging student-generated assessments with constant updates based on growth.

However, the key to accurately measuring growth requires a balance of product, process, and progress criteria (Guskey, 1994; Guskey, 2006; Jung & Guskey, 2007). Product criteria are performance based, summative in nature, and occur at the end of the learning process (e.g., portfolios, final projects, or final exams), similar to traditional assessments. In contrast, process criteria reports periodic check-ins that measure how one got to the learning (including quizzes, homework, participation, and attendance), and progress criteria focus on student growth in learning (formative assessment). Each of these criteria provides a holistic a picture of the child's academic experience, and in order for grades to accurately communicate student learning, a teacher should utilize all three forms of assessment within the classroom. According to Guskey (2001; 1994), there is no single method of reporting that will achieve all of these purposes. Therefore, the grade reform movement has called for a more detailed reporting tool than a single traditional letter grade in order to communicate a true picture of the student's learning.

Alternative grading practices have been proposed as a solution to this issue of the lone, omnibus grade.

A critical element of grading reform is determining how to accurately disseminate information regarding alternative grading practices and take grading reform conversations public. Brookhart (2011a) suggests starting the conversation by asking two key questions: "What meaning do we want our grades to convey and who is (are) the primary intended audience(s) for this message?" (p. 11). In this way, it all comes down to a philosophical shift in determining what is meant by a grade. Reeves (2011) echoes this by encouraging a "principle before policy" approach (p. 76). A school must determine philosophically what they want a grade to achieve before they implement any systematic steps toward reform.

In approaching the grading reform conversation in a politically heated environment or one of dissent, Brookhart (2011b) encourages involving all stakeholders in the discussion through methods such as local expert panels, vote/compare/discuss strategies, and fishbowl discussions. Only through open dialogue will the need for grading reform become clear and alternative assessment more widely practiced (Brookhart, 2011b).

Standards-Based Grading Practices: An Answer to Grade Reform

With reform efforts come a change in philosophy from a positivist approach of "sage on the stage" to a more constructivist approach of a "guide on the side" (Anderson, 1998, p. 6). Rather than solely imparting knowledge, the role of the teacher shifts to supporting students in their growth. Standards-based grading allows for a system that evaluates students by their proficiency in meeting a pre-determined learning standard (McTighe & Tomlinson, 2006). Students are assessed on their performance against this standard rather than against each other.

History of Standards-Based Grading

The concept of standards-based grading stems from the movement toward standards-based accountability for schools. While pockets of districts and individual educators have been utilizing standards-based elements since the 1970s and even earlier, Hamilton, Stecher, and Yuan (2008) claim the National Commission on Excellence in Education's publication of *A Nation at Risk* in 1983 to be a pivotal moment for the standards-based movement. This report characterized the United States educational system as being subpar and at risk of losing its status as a world leader; recommendations for improvement included increased rigor, new standards, and increased teacher preparation and pay (National Commission on Excellence in Education, 1983).

This movement was propelled in 1989 with President George H. W. Bush's education summit calling for the country to set common "education goals" (standards) and accountability measures (Klein, 2014). While "Standards Based Reform" became a critical component of the No Child Left Behind (NCLB) legislation, Wilson and Gloden (2001) observed, "The slogans of standards and SBR spread widely in the 1990s, but the meaning varied across contexts" (p. 195). "Grade reform" became difficult to differentiate from "test reform." Texas, Kentucky, and California were some of the first states to move forward with grading reform, but by the early 2000s standards-based accountability systems had been adopted by every state in America in order to comply with NCLB (Hamilton et al., 2008). However, each state's standards-based accountability system was unique; the country lacked standardization. Therefore, in 2009 a state-led effort began in order to found the Common Core State Standards Initiative (National Governors Association Center for Best Practices, 2010). As of August 2015, 42 states have adopted the Common Core State Standards in English/Language Arts and math.

Guskey (2009) explains the power of common educational standards such as the Common Core in influencing grading reform:

> In education, "standards" represent the goals of teaching and learning. They describe what we want students to know and be able to do as a result of their experiences in school. Well-defined standards identify the specific knowledge, skills, abilities, and disposition that we hope students will acquire through interactions with teachers and fellow students in school learning environments. (p. 1)

A teacher has a "standards-based classroom" when their instruction and assessment is aligned with these standards. An educational system led by common standards creates both a clear picture for teachers with regard to instruction and assessment and well-defined learning targets for students (Dueck, 2011; Spencer, 2012).

Teachers report that it is difficult to have a standards-based classroom while still reporting using traditional grading methods (Jones, 2013; Melograno, 2007; Post, 2014; Souter, 2009). In her qualitative study, Urich (2012) shares the personal experiences of teachers during the transition from traditional to standards-based grading:

> As they discovered the meaning of formative assessment data in guiding instruction, the teachers found it difficult to reconcile the use of formative data with their assignment of traditional letter grades. These cognitive struggles were reduced when they began to report out students' performance based on standards instead. (p. 99)

Guskey and Muñoz (2015) call for grades to be meaningful and informative, which they claim cannot be done within a traditional grading system that limits a teacher's ability to provide

detailed feedback on individual academic standards. It became difficult to marry a classroom's assessments based on standards and a traditional grade reporting system, leading Shippy, Washer, and Perrin (2013) to ask the question, "Because standards are used to guide curriculum, why not assess just on mastery of standards?" (p. 15). Over time, research by these and other grade reform experts such as Guskey (1994; 2001; 2006; 2009; 2011), Marzano (2000), Stiggins (1991; 2004, 2005, 2009), and Wormeli (2006a, 2006b, 2011, 2014) over the course of a decade led to an increased focus on assessment *for* learning based on pre-determined standards. Thus, a standards-based classroom naturally leads to the need for a standards-based grading and reporting.

Tenets of Standards-Based Grading

Each standards-based grading system looks a bit different due to the unique manner of implementation at a given school. These differences arise because applying a standards-based grading model brings obstacles in terms of policy, technology, and level of acceptance that each school must navigate individually. However, there are basic tenets considered essential to this grading model that will be found at almost any school implementing standards-based grading.

Redos and retakes. In standards-based grading, students are allowed to retake an assessment at any time, even if the class has moved on to new material. The purpose of redos and retakes is to allow students to learn and reach mastery within their own time frame (Fisher, Frey, & Pumpian, 2011) and show growth over time (Guskey, 2011). The new grade completely replaces the old grade rather than being averaged with the old grade. Wormeli (2011) argues allowing these redos and retakes creates a system wherein the assessment in the gradebook truly captures students' most recent learning rather than being tied to a single moment in the past that is no longer accurate. Outside of K-12 education, assessments such as the drivers license exam

and professional examinations in the realms of law, medicine, and accounting may all be retaken multiple times until mastery is proven.

Removing zeros. Rather than putting in a zero, alternative grading practices suggest putting in a fifty percent or "evidence not yet available" (Connor & Wormeli, 2011; Reeves, 2004; Wormeli, 2006). This practice mediates the mathematical inaccuracy of averaging a zero by maintaining the ten percent difference in letter grades. While some teachers argue this is giving points for work not done, they must acknowledge that an F is an F whether it is zero percent or fifty percent (Reeves, 2004). Not including zeros protects the student's ability to recover and have their final grade be a more accurate representation of their mastery.

Separate behavior grades. If the purpose of the grade is to communicate academic achievement, then behavior should not be included in the grade (Connor & Wormeli, 2011; Guskey, 1994, 2011; Scott, 2005). This is not to say that behavior should not be documented and reported to parents and students. Rather, behavior should be documented *separately*. In a standards-based gradebook, this often takes the form of a separate behavior grade alongside the academic grade or a behavior rubric to be included with the report card. Scott (2005) refers to this as "academic only" grades versus attitude or effort grades that are mistakenly blended into traditional grading. Separating academic and nonacademic factors clarifies both behavior and learning for all stakeholders.

All of the above alternative grading practices are present in a new philosophy towards assessment and reporting: standards-based grading. Standards-based grading stems from the philosophy of standards-based education. Studies have shown that standards-based teaching practices correlate to higher academic achievement (Post, 2014; Schoen et al., 2003). For example, Souter (2009) found that standards-based

grading has the ability to provide quality, descriptive feedback that increased student achievement and motivation. A natural step from standards-based teaching would be to implement standards-based grading, as it incorporates many of the alternative grading practices discussed above, requiring frequent formative evaluation based on standards in order to achieve assessment for learning (Stiggins, 2005).

A Standards-Based Gradebook

Because standards-based grading requires a philosophical shift in grading, it also requires a differently structured gradebook for reporting student progress. However, very few changes have been made to the traditional gradebook structure in the past century (Johnson, 1918). Buckmiller and Peters (2014) point out that many electronic grade reporting systems used by schools today struggle to create a reporting format that accommodates a standards-based grading model. Therefore, there is currently no streamlined format for a standards-based gradebook. Each school utilizing standards-based grading has their own reporting model. However, because standards-based grading requires a shift from reporting behavior to reporting learning, a standards-based gradebook format will look different than a traditional gradebook (Guskey, 2001).

A traditional gradebook is assignment specific (see Figure 2.1). Each column designates an assignment/assessment and is populated with a numeric point value or percentage earned. Assessments may include items such as quizzes, projects, journals, papers, participation, or behavior and the score is often based on a 100 point scale (Guskey, 2006). Points or percentages are then averaged at the end of the term to create a single value representative of the student's learning at the end of the course. While new columns are created for new assignment entries, rarely are data points changed once entered (O'Connor & Wormeli, 2011).

Traditional Grade Book			
Name	Homework Average	Quiz 1	Chapter 1 Test
John	90	65	70
Bill	50	75	78
Susan	110	50	62
Felicia	10	90	85
Amanda	95	100	90

Figure 2.1. Example of a Traditional Gradebook. Reprinted from "Seven Reasons for Standards-Based Grading," by P. Scriffiny, 2008, *Educational Leadership, 66(2)*, pp. 70-74. Copyright 2015 by ASCD.

In contrast, a standards-based gradebook is in constant flux. Rather than assignments/assessments in gradebook columns, key standards covered in each course are listed in each column (see Figure 2.2). Rather than a point or percentage value, a proficiency rating from a predetermined scale is used to show student progress against the standard. Proficiency scales generally function on four or five points rather than the 100 point scale of traditional grading. Proficiency scales may be numeric such as 0 – 5 or use words such as not proficient, emerging proficient, proficient, advanced proficient (Marzano & Heflebower, 2011).

An assessment may encompass multiple standards and each standard is to be assessed multiple times. Therefore, rather than inserting a new column for every assignment or standard, the previous proficiency rating is simply replaced with the most recent rating (Guskey, 2001). Thus, only the student's current level of ability with regard to that standard is being reported. At the end of the term, students will receive a final proficiency rating for each standard rather than a single, overall grade for the course (O'Connor & Wormeli, 2011). In a traditional gradebook, behavioral elements such as participation, following directions and attendance are communicated with points and averaged into the final course score. In a standards-based gradebook, behavioral elements are reported as their own standards. Therefore, they hold no bearing on the student's grade on academic standards (Guskey, 2011).

Standards-Based Grade Book			
Name	Objective 1: Write an alternate ending for a story	Objective 2: Identify the elements of a story	Objective 3: Compare and contrast two stories
John	Partially proficient	Proficient	Partially proficient
Bill	Proficient	Proficient	Partially proficient
Susan	Partially proficient	Partially proficient	Partially proficient
Felicia	Advanced	Proficient	Proficient
Amanda	Partially proficient	Advanced	Proficient

Figure 2.2. Example of a Standards-Based Gradebook. Reprinted from "Seven Reasons for Standards-Based Grading," by P. Scriffiny, 2008, *Educational Leadership, 66(2)*, pp. 70-74. Copyright 2015 by ASCD.

Standards-Based Grading Versus Competency-Based Education

Due to its many similarities, standards-based grading is occasionally confused with competency-based education. In both systems, students use formative feedback to work toward a pre-determined standard. In a standards-based system, each grade level and course comes with its own pre-determined set of standards. However, a competency-based education system is more comparable to a personalized learning system that can operate outside of any pre-set grade level curriculum and instead completely on the time frame and ability of a single student. According to the United States Department of Education (2015), competency-based education is "a structure that creates flexibility, allows students to progress as they demonstrate mastery of academic content, regardless of time, place, or pace of learning" (para. 1). With competency-based education, students are able to move through *all* standards at their own pace rather than being limited to only the standards in their current course by age or seat time. Competency-based skills can be met at any time both in and out of the classroom. In contrast, standards-based grading is completed within a traditional K-12 classroom structure.

Challenges Of Standards-Based Grading

There are some critics of the standards standards-based approach to classroom instruction and assessment. Baines and Stanley (2006) claim standards-based education has "iatrogenic consequences," such as disseminating a fixed curriculum, deemphasizing individualization, subverting the role of the teacher, focusing on only quantitatively measurable outcomes, and adding more bureaucracy to the educational system. Tomlinson (2000) highlights the fact that there can be both positive and negative outcomes to standards-based education, claiming effectiveness depends on district execution. Tomlinson notes some problematic schools where the outcome is "telling instead of teaching" and a need to "cover the standards," versus other successful schools where they are "seeing the big picture of science instruction for K-12 over time," and differentiating based on individual student level for each standard (pp. 8-10). She argues the success of standards-based education relies largely on its philosophical implementation. Some studies have shown little difference between classes with traditional and standards-based grading (Craig, 2011; Dean, 2014; Rosales, 2013), further fueling the argument that implementation plays a key role in effectiveness.

Thompson (2001) addresses this philosophical issue by cautioning against equating authentic standards-based reform with test-based reform. Test-based reform requires mastery on a single standardized test, whereas true standards-based reform propagates what all students should be able to know, understand, and do. Thompson goes as far as to call test-based reform the "evil twin" of standards-based reform, as many political leaders who push for accountability via standardized assessment do so under the guise of standards-based reform.

Another challenge to standards-based grading is its actual implementation. Peters and Buckmiller (2014) found schools that utilized thoughtful planning and frequent communication

with stakeholder groups had an easier time implementing a standards-based grading model. However, these schools were not able to overcome all challenges. For example, many participants in their study cited a lack of ability to create a standards-based grading system within their electronic recordkeeping system. Many companies currently only offer percentage-based systems for grading. Buckmiller and Peters (2014) also found an implementation dip where the shift in grading model initially had negative effects on homework completion and redos/retake policies.

Parents and teachers with a traditional approach to education can be another challenge in implementing a standards-based grading model due to the fact that it involves a philosophical change in the grading paradigm. Erickson (2010) describes grading practices as the "third rail" – if you touch it, you'll die. He claims this stems from the fact that parents tend to compare any change to their own deeply rooted experiences in school. For example, percentages and letter grades have a social history and context. In contrast, standards-based grades such as 1, 2, 3, 4 and "secure," "developing," "beginning" currently have no cultural meaning behind them and thus become difficult for parents to place in context (Guskey, Swan, & Jung, 2011). Parents also question how standards-based grading influences GPA, awards, scholarships, and college admissions (Brookhart, 2011b). Yet, many institutions, including the entire states of Illinois and Maine are supportive of accepting proficiency-based diplomas that utilize practices similar to standards-based grading (Alvarez, Casino, Flohr, & Suri, 2014; Rier, 2013)

As these reform efforts continue, the field remains split with some educators desperately hanging on to traditional grading practices and with others charging boldly forward. At this point in time it is difficult to determine the impact of alternative grading practices or standards-based grading because the implementation of these grading reform efforts is an area with little to no

empirical research. While there are studies that illuminate the confusion amongst teachers and parents in regard to traditional grading practices and report cards (Goodwin, 2003; Lubienski, 2004; Munk & Bursuck, 2001), as well as theoretical articles supporting grading reform (Guskey et al., 2011; O'Connor & Wormeli, 2011; Stiggins, 2004), there is a clear lack of empirical research on the implementation of alternative grading practices.

Individual Growth and Student Mindset

Because alternative grading models focus on personal growth as a motivation to learn, individual mastery and goal orientation become fundamental tenets of standards-based grading systems. Thus, standards-based grading and growth mindset go hand in hand. Carol Dweck, a pioneer researcher in the area of implicit theories of intelligence or "mindset," began researching the topic in the 1970's. Since then, she has published numerous articles regarding the differences between fixed and growth mindsets in relation to motivation and learning (Diener & Dweck, 1978; Dweck, 1975, 1986, 2003, 2015; Dweck & Leggett, 1988; Dweck & Reppucci, 1973; Elliott & Dweck, 1988; Henderson & Dweck, 1991; Hong et al., 1999; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Dweck (2015) describes implicit theories of intelligence as "meaning systems" that each individual creates in order to guide how they think, feel, and act when faced with intellectual tasks. In fact, these theories are often so implicit that the individual is not cognitively aware that their mindset is guiding their thoughts and behavior (Burnette et al., 2013).

When an individual has a fixed mindset, they view their abilities as predetermined rather than malleable. Thus, they believe any effort toward personal development to be futile (Molden & Dweck, 2006). Those with a fixed mindset use phrases such as, "I've never been good at math" or "Puzzles just aren't my thing," attributing their challenges as something they are born

with rather than something they can control (Ames, 1984; Job et al., 2015). Therefore, they do not choose to engage in tasks or learning in areas where they do not already feel confident. These beliefs create a fear of failure and a preference for performance-type tasks often found in traditional grading system due to the fact that the assessments allow the individual to prove their intelligence (Hong et al., 1999).

In contrast, individuals with a growth mindset believe in their personal ability to expand their learning and abilities through effort. Rather than shying away from effort, they view it as a tool to measure their success. Consequently, they value feedback, goal setting, and opportunities to obtain mastery of a new skill (Burnette et al., 2013; Yan et al., 2014). These learning oriented strategies and beliefs build resilience, allowing growth-minded students to persevere when faced with challenges rather than fall into helpless patterns. Studies have shown that these skills allow for increased growth and achievement over time (Dweck, 2006; Job et al., 2015; Molden & Dweck, 2006).

Characteristics of Mindset

Even though a fixed and growth mindset are very different, an individual can possess both in different parts of their lives due to the fact that mindset can be situational (Dweck & Leggett, 1988). For example, a student may have a fixed mindset with reading but a growth mindset when it comes to math. There are significant differences between fixed and growth mindset individuals regarding the way they view both themselves and situations (Ames, 1984; Dweck, 1986; Romero et al., 2014). Therefore, an individual's mindset toward the given situation must be determined by examining their specific attitudes and actions in regard to the topic.

Views on failure

Students with a fixed mindset view failure very differently than those with a growth mindset. Students with a growth mindset have a focus on learning. They view failure as a cue to try something new and provide a continued effort. Thus, failure often results in an increase in effort, self-monitoring, and self-instruction for a growth-minded student (Diener & Dweck, 1978). In contrast, a fixed mindset student sees failure as the direct result of low intelligence and therefore an "indictment of themselves" as individuals (Dweck, 2015, p. 10). Exerting any more effort would be further evidence of their lack of ability. In their mind, failure is unable to be overcome because it is based on uncontrollable factors they feel cannot be remediated. Therefore, when they fail they feel helpless (Diener & Dweck, 1978; Hong et al., 1999). According to Dweck (2006), instead of failure being an action as in "I failed," it becomes an identity as in "I am a failure." These beliefs can create a sense of learned helplessness in a fixed mindset student.

Effort in response to challenge

When a student feels helpless, they develop patterns of self-handicapping. For example, Doron, Yannick, Boiché, and Le Scanff (2009) found students with a fixed mindset "shy away from effort and challenge to focus on validating and protecting their sense of ability at the expense of learning" (p. 525). Dweck (2015) explains the logic behind this decision:

> If you withhold effort and do poorly, you can still think highly of your ability, and you can preserve the belief that you *could* have done well if you had applied yourself. If you somehow happen to do well anyway, then this is the supreme verification of your intelligence. (p. 41)

Because they do not want their intelligence called into question, they will intentionally withhold effort on a difficult task through self-handicapping behaviors such as procrastinating, avoidance, or not studying. They may also call attention to previous success as a distraction tool to deal with anxiety and self-doubt. Dweck (1986) stresses that these maladaptive patterns can become especially hindering as students age because it influence long-term choices and decisions.

In contrast, students with a growth mindset will persist when confronted with obstacles due to higher concentration and diligence. Rather than shying away, they will actively seek out challenging tasks in order to demonstrate mastery due to their self-motivated orientation (Ames, 1984; Diener & Dweck, 1978; Dweck & Reppucci, 1973; Ommundsen, Haugen, & Lund, 2005). According to a study by Yan, Thai, and Bjork (2014), growth-minded students showed the ability to manage their own learning in a more productive way such as self-testing, restudying, and utilizing feedback. This self-regulation is important because it creates resilience. Students with a growth mindset are able to use their resources more effectively and do better with challenge. These self-regulation strategies were found to permeate all aspects of students' life, showing less procrastination, excessive spending, and junk food consumption (Job et al., 2015). Rather than seeing failure and challenge as a personal deficit like a fixed mindset individual would, those with a growth mindset see challenge and failure as a means to self-diagnose their attention and effort (Doron et al., 2009; Molden & Dweck, 2006)

Self-Esteem

A fixed mindset can prove dangerous when a student begins to equate their performance with who they are as a person. This correlation can have a negative influence on self-esteem. Dweck (2006) stresses that having a fixed mindset makes students highly susceptible to stereotype threat because their self-worth becomes contingent on their performance. With a fixed

mindset, self-esteem becomes dependent on extrinsic recognition rather than something that comes from within. For example, fixed mindset students feel intelligent when they have "easy, low-effort successes, and [are] outperforming other students. Effort, difficulty, setbacks, or higher-performing peers call their intelligence into question-even for those who have high confidence in their intelligence" (Dweck, 2015, p. 3). This can especially create problems for gifted students who want to maintain their status label. If their self-esteem rests on the title of "being smart," a fixed mindset can cause them to shy away from challenging learning opportunities, resulting in a learning plateau (Mueller & Dweck, 1998).

This concern does not only affect the gifted. Dweck (2003) points out that ages 10-12 are critical years for social comparison. Students are constantly making observations regarding their own ability and those of their peers. These social comparisons create an implicit framework they can carry with them the rest of their lives and influence the way they interact with others. For example, students with a fixed mindset were found to focus on and criticize those who did poorly, while those with a growth mindset analyzed the strategies of those who did well and used them as a model (Molden & Dweck, 2006). Not only does it influence their social interactions, mindset influences self-esteem and self-talk. For example, when students were asked when they felt smart, fixed mindset students reported statements such as, "When I turn in my papers first and I get easy work," compared to a growth mindset statements such as, "When I'm reading a hard book When I don't know how to do it and it's pretty hard and I figure it out without anybody telling me. When I'm using what I know to teach someone else" (Dweck, 2015). These two mindsets create a dichotomy of individualistic self-challenge asking, "Did I try hard enough" versus competitive social comparison asking, "Am I smart enough?" These statements can come

to shape students' self-esteem and learning experiences throughout their education (Ames, 1984).

Praise

Although well-intentioned, praise from adults is one of the key ways students come to develop a fixed mindset. A common belief of many teachers and parents is that it is important to praise children in order to motivate and build self-confidence. In actuality, this can be highly detrimental to creating a growth mindset (Mueller & Dweck, 1998). According to Dweck (2015), once students are praised for their intelligence they are no longer interested in a challenge or learning. Meuller and Dweck (1998) claim that praising intelligence leads to a fixed mindset fear of failure because students end up believing intelligence is proven through performance. Their self-worth becomes intrinsically intertwined with performance, so even when they do genuinely succeed, any future failure would cause them to remeasure their ability. These effects of intelligence praise can explain why previously successful students struggle later on when presented with a challenge. On the other hand, praising student *effort* can lead to students developing a growth mindset. When a student is praised for their hard work and the path they took to get there rather than the final outcome, they learn to value the learning process itself (Dweck, 2003)

Goal Setting

Because fixed mindset students thrive on intelligence praise and growth mindset students appreciate effort praise, students with different mindsets tend to select different goals to focus on achieving. Fixed mindset students tend to focus on performance goals such as standardized tests or final assessments that allow them prove their competence. They seek to be judged and only select ability-focused performance goals they know will prove their ability. However, not

meeting the performance goal can lead to helplessness (Ames, 1984; Dweck & Leggett, 1988; El-alayli & Baumgardner, 2003). For self-preservation, they often withdraw from a challenge or select easier tasks to conceal a perceived lack of ability (Dweck, 1986). In contrast, those with a growth mindset have a mastery-orientation. They are more likely to pursue learning goals that allow them to develop new skills or expand their abilities because they understand the power of effort. Students with learning goals are more likely to take on a challenge and show more growth over time (Burnette et al., 2013; Dweck & Leggett, 1988). Dweck and Leggett (1988) simplify the difference between performance goals and learning goals as being a focus on "proving" versus "improving."

Elliott and Dweck's (1988) study shows the power of goals in producing a pattern of response. They found that the type of goal given to students strongly shapes the ways in which they respond to the goal. For example, students with low confidence who were given a performance task quickly fell into a fixed mindset pattern of helplessness. Those with high confidence who were given a performance task did take on a mastery approach to the task at hand, but were very unlikely to take on any further challenging tasks. However, students given a learning task all showed mastery approaches and improvement regardless of their original confidence level. These findings show the significant motivational power of a learning goal compared to a performance goal.

Dweck (2015), however, cautions against providing only learning goals for students. She notes that performance goals are a necessary part of society and measuring achievement. The concern between the two types of goals rises when performance goals begin to always take priority over learning goals.

Value of Feedback

A key component in goal setting is the use of feedback. Dweck (2006) claims, "If you're oriented toward learning, as [growth mindset students] are, you *need* accurate information about your current abilities in order to learn effectively" (p. 11). Without feedback, it is impossible to self-assess one's abilities or take on a learning goal. However, in order for feedback to be useful, it must be process-based feedback found with a growth mindset rather than person-based praise or criticism often found with a fixed mindset (Skipper & Douglas, 2012). Dweck (2015) explains how process feedback helps reach learning goals when paired with a growth mindset.

> In fact, learning goals allow teachers to set very rigorous standards. Within an incremental framework, critical feedback does not reflect on students' intelligence. It's merely information about what's wrong with their current work and how to improve it. So teachers can give candid, detailed feedback to students as they strive to meet high standards. (p. 152)

In order to build a growth mindset, it is key to provide strategy-oriented feedback that will build a sense of mastery rather than person-oriented ability feedback which may make the student feel good now but will put them at a disadvantage later when they encounter setbacks and obstacles (Dweck, 2015). Kamins and Dweck (1999) found that a helpless pattern of response to setbacks occur when self-worth becomes contingent on ability feedback. Students become highly vulnerable, less persistent, and less motivated. Another study found that students with a fixed mindset had a negative reaction to feedback and were less able to correct errors on subsequent retests (Mangels et al., 2006). It was speculated that this was because little deep, semantic processing of feedback was happening by fixed mindset students due a perceived lack of value.

Impact of Mindset on Student Achievement

Molden and Dweck (2006) suggest that differences in mindset can impact students' achievement not only on individual assessments but over their entire educational career. College can be an especially difficult time for students with a fixed mindset because they do not necessarily know how to function independently with challenges due to self-handicapping. In contrast, students with a growth mindset are able to employ greater self-monitoring and self-regulatory strategies (Dweck, 2003, 2006). However, the effects of mindset can be seen much earlier than college. The difficulty in assessing mindset is that one does not necessarily see the effects of it until the student is presented with a challenge and success becomes difficult. Motivational beliefs attributed to mindset often become more of a factor in middle school compared to elementary due to the increase in rigor and the social pressures of adolescence (Blackwell et al., 2007)

Multiple studies have shown a correlation between students' mindset and their academic achievement. A two year study by Romero, Master, Paunesku, Dweck, and Gross (2014) found that middle school students with a growth mindset took on harder math courses and had higher grades than their fixed mindset counterparts. Blackwell, Trzesniewski, and Dweck (2007) found similar results in their study of math achievement. Those with a growth mindset had higher math achievement scores not only on individual tests but a positive trajectory over their entire junior high career compared to their peers. Henderson and Dweck (1991) directly compared a pre-test on students' mindset with their achievement over the year. They found that students with a fixed mindset showed a decline in class standing even with high confidence. However, even those with low confidence increased in class standing if they had a growth mindset.

Shifting Mindset

It is important to note that one's mindset is not permanent. Multiple studies have found that a growth mindset can be cultivated in those originally showing a fixed mindset. For example, Dweck (1975) created a set of training procedures that attributed lack of success to lack of effort as a means to reverse learned helplessness. Students who received the training improved their performance over time, whereas students who saw success only were found to deteriorate in performance. In addition, Sciarretta and Cacciamani (2012) successfully used metaphors and story telling in order to shift students' beliefs from fixed to growth mindset. They found that actively modeling and teaching mindset bled into students' personal beliefs over time. Blackwell, Trzesniewski, and Dweck (2007) used meditational intervention material with seventh grade students and were able to promote a growth mindset. Students in the experimental group showed greater motivation and grades compared to a downward trajectory in the group who didn't receive the intervention. In fact, Yeager and Walton (2011) found that it was more often smaller socio-psychological interventions over time such as small group discussion, reflection, personal connections that created a lasting growth-focused educational environment rather than a single, large intervention. These studies show the malleable nature of mindset and its ability to be cultivated in students. Yet, there are no studies exploring whether standards-based grading practices promote a growth mindset. Many tenets of standards-based grading such as redos/retakes, removing zeros, and standards-based learning targets align with the motivational theory behind growth mindset. This study hypothesizes that students who attend a school that utilizes standards-based grading methods are more likely to exhibit characteristics of a growth mindset than students who attend a school with traditional grading practices. Furthermore, the

study hypothesizes that both standards-based grading and growth mindset characteristics predict a students' beliefs about the changeability of intelligence.

Summary

This review of the literature provided an explanation on the history of traditional grading and the concerns it poses; the need for grade reform and what it would entail; and challenges that come with putting alternative grading practices into action. This chapter also provided an overview of mindset and a contrast of fixed and growth mindset. Review of the literature shows that separately standards-based grading practices and growth mindset characteristics both have positive impacts on student achievement. While both topics are intrinsically connected, little research has been done connecting the two. The purpose of this study was to add to the research specifically in the area of standards-based grading and growth mindset to identify connections between the two concepts that could theoretically lead to increased student achievement.

CHAPTER 3

METHODOLOGY

The purpose of this study was to examine the relationships between standards-based grading, characteristics of mindset, and belief about intelligence. The research design was guided by Carol Dweck's (2015) theory of mindset as a conceptual framework which classifies a student's beliefs and behaviors regarding intelligence as either a fixed or a growth mindset. Understanding the extent to which grading models impact students' views toward learning and their influence on students' beliefs about their intelligence can aid in establishing grading practices that help to promote a growth mindset, positive views toward learning, and positive beliefs about one's ability to change one's intelligence. This chapter provides a detailed explanation of the research design including the research questions, methodological approach, discussion of data collection, discussion of the survey instrument, and an examination of the variables and data analysis.

Research Design

This quantitative study utilized survey research methodology based on an objectivist epistemology and a post-positivist paradigm. Mertens (2009) claims the philosophical orientation of the researcher influences their paradigm and all of the assumptions that go with it. These assumptions directly impact choices made during the research process and must therefore be made explicit. According to Crotty (1998), an epistemology provides "a way of understanding and explaining how we know what we know" (p. 3). From an objectivist perspective, the researcher acts to discover meaning rather than create it, which requires use of the scientific method. This epistemological foundation provides a framework for methodological choices of observation and measurement.

An objectivist view requires use of the scientific method within the context of a given theory (Crotty, 1998). A postpositive approach acknowledges that absolute truth can never be achieved when dealing with human behavior. Rather, there is a focus on verifiable observation and measurement in order to determine how causes may influence outcomes (Creswell, 2013). Butin (2010) asserts post-positivism to be a quest to find the best procedures to measure and determine what works for society. Determining to what extent characteristics of mindset and grading practices predict belief about intelligence fits within the post-positivist paradigm.

Methodological Approach

For the present study, a survey research design was used. This process was "rigorous and systematic" in order to ensure the ability for scientific replication (Ballou, 2008). Data collection was conducted through a self-administered online survey in order to determine characteristics of a student's mindset at the given moment. Additionally, the researcher used survey data to quantify students' responses to questions regarding their belief about intelligence. Data were then used to determine whether the student possessed a fixed or growth mindset in pre-determined categories based on characteristics of mindset. Additional data regarding students' current grading system and demographic characteristics were collected via each school district's information database.

Survey Research

Surveys are a common data collection tool for post-positivist research. According to Creswell (2013), survey research "provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population" (p. 13). An advantage to survey research is that it provides a time and cost efficient means of data collection. Several online tools are available that are low cost or even free. These tools allow the research to

provide self-administered surveys with ease that can quickly be completed anonymously and at a time convenient for the participant (Sue & Ritter, 2007). Check and Schutt (2012) also claim surveys to be a popular tool to gather information due to their "versatility, efficiency, and generalizability" (p. 160).

While it would be near impossible to draw information from an entire population, a sample survey procedure allows the researcher to poll only a select quantity of the population and produce inferences to be made that can generalized (Rea & Parker, 2014). Data provided in surveys allow the researcher to identify these trends and explore relationships between variables. These sample results can then be generalized to a population as representative of a "single point in time" (Vogt & Johnson, 2011, p. 87). Because a quantitative measure of the relationship between participant's mindset, belief about intelligence, and grading model was needed for this study, survey research was considered the most appropriate design.

A concern with survey research is the potential for bias. Fowler (2014) defines bias as a "systemic way that people responding to a survey are different from the target population as a whole" (p. 10). The potential for bias is increased when using nonrandom sampling techniques, presenting biased questions, poor timing of survey delivery, restricting participant access, participant honesty is in question, and sample demographics fail to accurately represent the population (Fowler, 2014). Although efforts were made to mitigate bias, it is always possible with survey research. Thus, survey bias is a limitation in this study.

Research Questions

The following questions guided this quantitative research study:

1. What are the background characteristics of middle school students who participated in this study?

2. To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' mindset characteristics based on a) effort in reading, b) effort in math, c) goal setting, d) views on failure, and e) belief about intelligence?
3. To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' response to a) growth mindset praise, and b) fixed mindset praise?
4. To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a growth mindset responses for a) effort in reading, b) effort in math, and c) goal setting?
5. To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a fixed mindset response to failure and mistakes?

Sample and Participants

Participants in this study were seventh grade students from middle schools with similar demographics from the suburbs of a city in the central United States. Participants were recruited from middle schools utilizing a traditional grading model and from middle schools using a standards-based grading model. The survey was administered electronically using Google survey software via classroom laptops. Table 3.1 provides demographics of participants.

Table 3.1

Demographics of Participants by Site

Participants	*Grading Model*	*Total*	*Non-White*	*TAG*	*ELL*	*SPED*
School A	Traditional	217	39	51	12	13
School B	Standards-Based	206	32	21	0	4

Survey Instrument

The survey instrument (Appendix A) was created through a collection of pre-existing surveys as well as questions created by the researcher based on theory and research related to the topic area. The survey consisted of four sections: Demographics (3 questions), Characteristics of Mindset (6 subsections), Beliefs about Intelligence (5 questions), and Open Response (8 questions). This survey was piloted with a group of 48 seventh grade students in order to provide feedback for revision.

The first section of the survey consisted of three questions addressing students' demographics, specifically a student's gender, age, and school identification number. By reporting their identification number, the school site was able to later match student responses with demographic characteristics provided by the school's information system. The demographic characteristic later matched during the analysis phase for this study was race/ethnicity.

The second part of the survey consisted of five subsections each regarding specific characteristics of mindset including praise, effort, goal setting, self-esteem/views on failure, and value of feedback. Each subsection included a matrix of statements asking the participant to rate their level of agreement to each statement choosing from 1 = "Strongly Disagree;" 2 = "Disagree;" 3 = "Agree;" and 4 = "Strongly Agree." For example, the subsection focused on the characteristic of praise asks participants, "When you are successful with a challenging task, to

what extent do you like to be told…" Items within this subsection matrix included statements such as "You are smart," "You grew a lot," "You are good at this," and "You have learned a lot."

The third section of the survey included five questions designed to assess participants' beliefs about intelligence. These survey questions were adapted from Dweck's (2015) Theories of Intelligence Scale. The five questions addressed the root of intelligence and its level of malleability in order to determine whether the individual has a fixed or growth disposition toward intelligence. Items included questions such as "If you work hard, you can change your level of intelligence," "If you don't learn something quickly, you are not smart," and "Being smart is something you are born with." Participants rate their level of agreement to each statement choosing from 1 = "Strongly Disagree"; 2 = "Disagree"; 3 = "Agree"; 4 = "Strongly Agree."

The fourth component of the survey consisted of open-ended responses that sought to identify students' attitudes toward feedback. Questions included items such as "What do you do with the feedback you receive from teachers on your work?" and "How do you feel if you are one of the last people to turn in a test?" The final question of the survey asked students to evaluate on a scale of one to ten their familiarity with the characteristics of fixed vs. growth mindset. The purpose of this question is to identify any participants who may have previous experience with mindset that could bias their responses.

Data Collection

Data were collected from two sites. The Drake University Institutional Review Board deemed consent and assent forms unnecessary because participating school districts conducted the survey as an independent institution and were thus subject to their school district's consent and assent requirements as part of standard educational practice and techniques. Survey delivery

and data collection were conducted using Google online survey software. The school principal was given an electronic template of the survey, which they used to make their own private survey document. Only the building principal and other vested school employees (at the discretion of the school district) had access to raw data. Access to the survey was closed by school principals once they observed all appropriate students had completed the survey. The school district used their School Information System (Power School) to pull a report of additional demographic data (race/ethnicity, free/reduced lunch status, TAG status, ELL status, and SPED status). The school merged this file with the file of survey results and de-identifed this document by removing the student ID number from this file. This de-identified, anonymous data set was provided to the researcher. The researcher at no time had access to student names, ID numbers or any other identifiable information. This process was approved by the Drake Institutional Review Board.

Variables

This study was operationalized by analyzing variables through Dweck's (2015) framework of mindset and beliefs about intelligence. Survey results were used to examine connections between characteristics of mindset, belief about intelligence, and grading models used within a school system (standards-based versus traditional grading). Independent variables included participant demographics, grading model, belief about intelligence and attitudes toward praise which were tested as predictors of students' characteristics of mindset through hierarchical multiple regression. The dependent variable consists of students' characteristics of mindset. All independent and dependent variables are described in the following subsections.

Independent Variables

Descriptions and measurement design for independent variables are described below.

Background characteristics. Demographic data were identified via the survey instrument as well as data provided by the school's electronic record keeping database. Student identification numbers provided via the survey were aligned with demographic spreadsheets provided by the school to identify background characteristics. Independent variables include student gender, age, and race/ethnicity.

Gender. Participants identified their gender which will be recoded as a dichotomous variable with 0 = male and 1 = female.

Age. The age of each participant was recorded as a continuous variable.

Race/Ethnicity. Race/Ethnicity was measured by participant's parents when registering for school via identification from the following options: White, African American, American Indian or Alaska Native, Asian/Pacific Islander, and Hispanic or Latino.

School grading model. This variable was determined in advance based on the school location of participants. Schools utilized either standards-based grading (SBG) or traditional grading (non-SBG). This variable was recorded into a dichotomous variables with 0 = non-SBG and 1 = SBG.

Belief about intelligence. A survey item from Dweck's (2015) Theories of Intelligence Scale was used to create the independent variable *Belief about Intelligence*. The survey question asked participants to rate their level of agreement with the statement, "There are some things people just can't learn," on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." A lower score indicated more of a growth mindset.

Factored constructs of independent variables. The independent variables describing response to praise were each be measured via a matrix of survey questions all measured on the same four point Likert-scale where 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 =

strongly disagree. Each characteristic of mindset was an independent construct variable developed through exploratory factor analysis (EFA).

According to Tabachnick and Fidell (2007), factor analysis allows the researcher to establish "which variables in a set form coherent subsets that are relatively independent of one another" (p. 607). These variables are shown to be correlated and thus can be considered a single factor. A principle component with a varimax rotation approach was used for the factor analysis. A conservative approach of a .44 factor loading was used for acceptance of an item in interpretation of the factor (Vogt & Johnson, 2011). Factor loadings above .30 are considered "somewhat large" by Merlter and Vannatta (2013). All constructs must also meet an acceptable level of Kaiser's measure of sampling adequacy (KMO) in that "components with four or more loadings above .60 in absolute value… are reliable, regardless of sample size" (Mertler & Vannatta, 2013). The following constructs were evaluated via exploratory factor analysis.

Growth Mindset Praise. The variable *Growth Mindset Praise* was measured via survey instrument questions in order to determine whether students appreciate praise of their effort. Participants were asked to what extent they would like to be told the following statements when successful with a challenging task. For example, "You worked really hard," "You learned a lot," and "You used great strategies." Participants were asked to rate their agreement with five statements on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." Higher scores indicated a growth mindset preference toward effort-based praise. Table 3.2 reports the items and factor loadings for the praise construct.

Table 3.2

Factor Analysis for Growth Mindset Praise Construct (α = .813)

Item	Factor Loadings
When you are successful with a challenging task, to what extent do you like to be told…	
You worked really hard	.660
You grew a lot	.741
You kept at it	.827
You used great strategies	.757
You have learned a lot	.793

Fixed Mindset Praise. The variable *Fixed Mindset Praise* was measured via survey instrument questions in order to determine whether students appreciate praise of their abilities. Participants were asked to what extent they would like to be told the following statements when successful with a challenging task. For example, "You are smart," "You are awesome," and "You are good at this." Participants were asked to rate their agreement with three statements on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." Higher scores indicated a fixed mindset preference toward ability-based praise. Table 3.3 reports the items and factor loadings for the fixed mindset praise construct.

Table 3.3

Factor Analysis for Fixed Mindset Praise Construct (α = .703)

Item	Factor Loadings
When you are successful with a challenging task, to what extent do you like to be told…	
You are smart	.800
You are awesome	.820
You are good at this	.759

Dependent Variables

The following sections explain dependent variables of this study and how they were measured. Dependent variables include mindset characteristics of growth mindset effort in reading, growth mindset effort in math, growth mindset goal setting, and fixed mindset views on failure. Each characteristic of mindset was an independent construct variable developed through exploratory factor analysis (EFA).

Growth Mindset Effort for Reading. The variable of *Growth Mindset Effort for Reading* was measured via a subsection on the survey instrument. Given students may have different responses regarding level of effort based on the course they are in, effort in math and effort in reading were broken into two different constructs. Each question asked the participant to what extent they respond with certain behaviors when they encounter something difficult or challenging in reading. Example responses include "Trying a different strategy," "Asking clarifying questions," and "Asking for help from an adult." Participants were asked to rate their agreement with five statements on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." Higher scores indicated effort-based responses in line with a growth mindset toward the subject of reading. Table 3.4 reports the items and factor loadings for the growth mindset effort construct in the subject of reading.

Table 3.4

Factor Analysis for Growth Mindset Effort Construct in the Subject of Reading ($\alpha = .639$)

Items	Factor Loadings
When trying to learn something new in reading and you find it difficult or challenging, to what extent do you respond by…	
Trying harder	.493
Asking clarifying questions	.742
Asking for help from an adult	.758

Table 3.4 (Continued)

Factor Analysis for Growth Mindset Effort Construct in the Subject of Reading (α = .639)

Items	Factor Loadings
Asking for help from a friend	.633
Trying a different strategy	.548

Growth Mindset Effort for Math. The variable of *Growth Mindset Effort for Math* was measured via a subsection on the survey instrument. Each question asked the participant to what extent they respond with certain behaviors when they encounter something difficult or challenging in math. Example responses include "Getting frustrated," "Asking clarifying questions," and "Stopping or giving up." Participants were asked to rate their agreement with five statements on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." Higher scores indicated effort-based responses in line with a growth mindset toward the subject of math. Table 3.5 reports the items and factor loadings for the growth mindset effort construct in the subject of math.

Table 3.5

Factor Analysis for Growth Mindset Effort Construct in the Subject of Math (α = .706)

Items	Factor Loadings
When trying to learn something new in math and you find it difficult or challenging, to what extent do you respond by…	
Trying harder	.643
Asking clarifying questions	.747
Asking for help from an adult	.746
Asking for help from a friend	.607
Trying a different strategy	.643

Growth Mindset Goal Setting. The variable *Growth Mindset Goal Setting* attempted to measure the extent to which students prefer goals in the area of mastery (growth mindset) vs. performance (fixed mindset). Four matrix items within this survey subsection created this factored variable with higher scores indicating a preference for mastery-based tasks. Participants rated their level of agreement with statements such as "It's important to me that I learn a lot of new concepts this year" and "I prefer work when I can do it perfectly without any mistakes" with six statements on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." A higher score indicates a stronger growth mindset attitude toward goal setting. Table 3.6 reports the items and factor loadings for the growth mindset goal setting construct.

Table 3.6

Factor Analysis for Growth Mindset Goal Setting Construct (α = .742)

Item	Factor Loadings
Even if I don't do well at first, I will use the feedback I get to do better next time	.721
I have fun taking on a challenging task	.716
It's important to me that I learn a lot of new concepts this year	.776
When something is hard for me to do, I usually keep trying	.804

Fixed Mindset Views on Failure. These survey items sought to identify the impact of failure on students' self-esteem to create the variable *Fixed Mindset Views on Failure* with higher scores indicating a fixed mindset toward failure and self-esteem. Participants rated their level of agreement with five statements based on a 4-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly Agree." Example statements included, "If I make mistakes, I feel unhappy with myself as a person" and "If I don't do well on a test, I feel

I'm not smart." A higher score suggests a stronger fixed mindset response to failure. Table 3.7 reports the items and factor loadings for the fixed mindset views on failure construct.

Table 3.7

Factor Analysis for Self-Esteem/Fixed Mindset Views on Failure Construct (α = .759)

Item	Factor Loadings
It's important to me that I finish the test before other people	.542
If I don't learn something quickly, I feel like I'm not smart	.798
If I make mistakes, I feel unhappy with myself as a person	.768
If I don't do well on a test, I feel I'm not smart	.783
If I don't learn something quickly, I give up	.646

Summary of Independent and Dependent Variables

Table 3.8 provides as summary of the independent and dependent variables and how each was measured.

Table 3.8

Summary of Demographic, Independent, and Dependent Variables with Measurement Type

Variable	Type	Type of Measurement
Gender (1 = female)	IV	Dichotomous
Age	IV	Continuous
Race/Ethnicity[a]	IV	Nominal
Grading Model (1 = Standards-based grading)	IV	Dichotomous
Belief About Intelligence	IV	Ordinal
Growth Mindset Praise	IV	Continuous construct based on factor analysis
Fixed Mindset Praise	IV	Continuous construct based on factor analysis

Table 3.8 (Continued)

Summary of Independent and Dependent Variables with Measurement Type

Variable	Type	Type of Measurement
Growth Mindset Effort for Reading	DV	Continuous construct based on factor analysis
Growth Mindset Effort for Math	DV	Continuous construct based on factor analysis
Growth Mindset Goal Setting	DV	Continuous construct based on factor analysis
Fixed Mindset Views on Failure	DV	Continuous construct based on factor analysis

[a]*Scale: 1 = Asian, 2 = African American, 3 = Hispanic, 4 = American Indian/Alaskan Native, 5 = Multi-Racial, 6 = Native Hawaiian/Other Pacific Islander, 7 = White*

Data Analysis Procedures

The data for this study were analyzed using descriptive and inferential analyses to address the identified research questions.

Descriptive Statistical Analyses

Data were analyzed using SPSS v.20 software to identify means, standard deviation, and frequencies for both independent and dependent variables identified in Table 3.9. Descriptive statistics were used to answer research question 1 – What are the background characteristics of middle school students who participated in this study? Statistics are provided in a table representing all variables in Chapter 4. Additionally, skew and kurtosis values were run to assess data normality and to determine the extent to which the data met the assumptions of normality required for the inferential analyses conducted in this study.

Inferential Statistical Analyses

Inferential statistical analyses included independent samples *t*-tests to answer research questions two and three and hierarchical multiple regression analyses will be used to answer research questions four and five.

Correlations. Pearson product-moment correlations were conducted on independent and dependent variables in order to measure the effect size of each variable and determine the degree of predictability (Mertler & Vannatta, 2013). By calculating the effect size, the researcher was able to determine the extent to which a linear relationship existed between variables (Cronk, 2014). Data were screened in order to ensure both assumptions to conduct correlation analysis were met. These assumptions included variables being bivariately normally distributed, representative of a random sample from the population, and independent of all other variables (Tabachnick & Fidell, 2007)

A correlation matrix was developed for all variables used in analysis to ensure multicollinearity was not a concern for the hierarchical regression analysis (Mertler & Vannatta, 2013). In order to control for a Type 1 error of incorrectly assuming variables are related when conducting multiple correlations, the Bonferonni approach was utilized in determining statistical significance (Vogt & Johnson, 2011). The researcher used a Bonferonni adjustment by dividing the generally accepted level of significance (.05) by the number of correlations calculated (Mertler & Vannatta, 2013).

Independent samples *t*-test. Seven independent samples *t*-tests were conducted to answer research questions 2 and 3.

Specifically, the seven independent samples *t*-tests answered to what extent:

2a) is there a statistically significant difference based on grading model and growth mindset effort in reading?

2b) is there a statistically significant difference based on grading model and growth mindset effort in math?

2c) is there a statistically significant difference based on grading model and growth mindset goal setting?

2d) is there a statistically significant difference based on grading model and fixed mindset views on failure?

2e) is there a statistically significant difference based on grading model and belief about intelligence?

3a) is there a statistically significant difference based on grading model and response to growth mindset praise?

3b) is there a statistically significant difference based on grading model and reporting response to fixed mindset praise?

Hierarchical regression. A hierarchical multiple regression model was used to answer research questions 4 and 5 in order to determine the influence of independent variables on the dependent variable. Hierarchical multiple regression was selected because of its ability to "examine the influence of several independent variables in a specific order" (Mertler & Vannatta, 2013, p. 168). By using multiple regression techniques, the researcher was able to predict values of dependent variables and explain causal relationships. Multiple regression was appropriate for these research questions because it allowed the researcher to determine the order in which independent variables were entered into the equation and isolate their individual effects (Tabachnick & L. S. Fidell, 2007).

The equation for multiple regression is as follows:

$$Y = A + B_1X_1 + B_2X_2 +...+ B_kX_k + E$$

In this equation, Y = the predicted outcome of the dependent variable (outcome), A = the y intercept, B = the unstandardized regression coefficients for each independent variable, X = the

independent variable (predictor), and E = the unit of error. According to Vogt and Johnson (2011), the value of B represents the extent to which a change in the dependent variable relates to "an increase or decrease of one standard deviation unit in the independent variable — when controlling for the effects of other independent variables" (p. 27).

When using a multiple regression analysis, it is possible to have an unlimited number of predictor variables as long as the minimum sample size is utilized. Tabachnick and Fidell (2007) recommend the following equation be used to determine minimum sample size:

$$8m + 50 = N$$

For this equation, m = the number of independent variables and N = the minimum number of participants. The maximum number of independent variables applied to the regression model is 15 for this study. Therefore, the minimum accepted sample size for this study is 170, and the actual sample size is $n = 423$.

Regression model blocking. The purpose of using multiple regression for research questions 4 and 5 was to determine the extent to which factors such as grading model and belief about intelligence influence students' mindset characteristics. A sequential hierarchical approach was used for all four regressions with independent variables being entered in three blocks. The first block consisted of inherent characteristics. These characteristics included gender and belief about intelligence. These variables are entered in the first block in order to account for variables innate to the learner. The second block consisted of fixed mindset praise and growth mindset praise, both of which were created via Exploratory Factor Analysis. The purpose of placing these variables in block two was to separate the influence of outside forces on students' mindset. Fixed and growth mindset praise are both provided by the teacher, outside the control of the learner. The third block consisted of the independent variable of school grading model, either traditional

or standards-based grading. The purpose of entering this variable in block three was to isolate the impact of grading model after controlling for inherent and instinctive characteristics.

The dependent variables in the four hierarchical regression analyses were related to characteristics of mindset. Prior to analysis, Exploratory Factor Analysis was used to create four categories of mindset characteristics a) growth mindset effort in reading b) growth mindset effort in math c) growth mindset goal setting and d) fixed mindset views on failure. Each of these four constructs represents a characteristic of mindset measured via the survey instrument. A separate hierarchical regression was run for each dependent variable with the intent of determining the extent to which innate (gender and belief about intelligence) and outside (fixed and growth mindset praise) factors influence each mindset characteristic. Figure 3.1 provides a visual representation of the regression model.

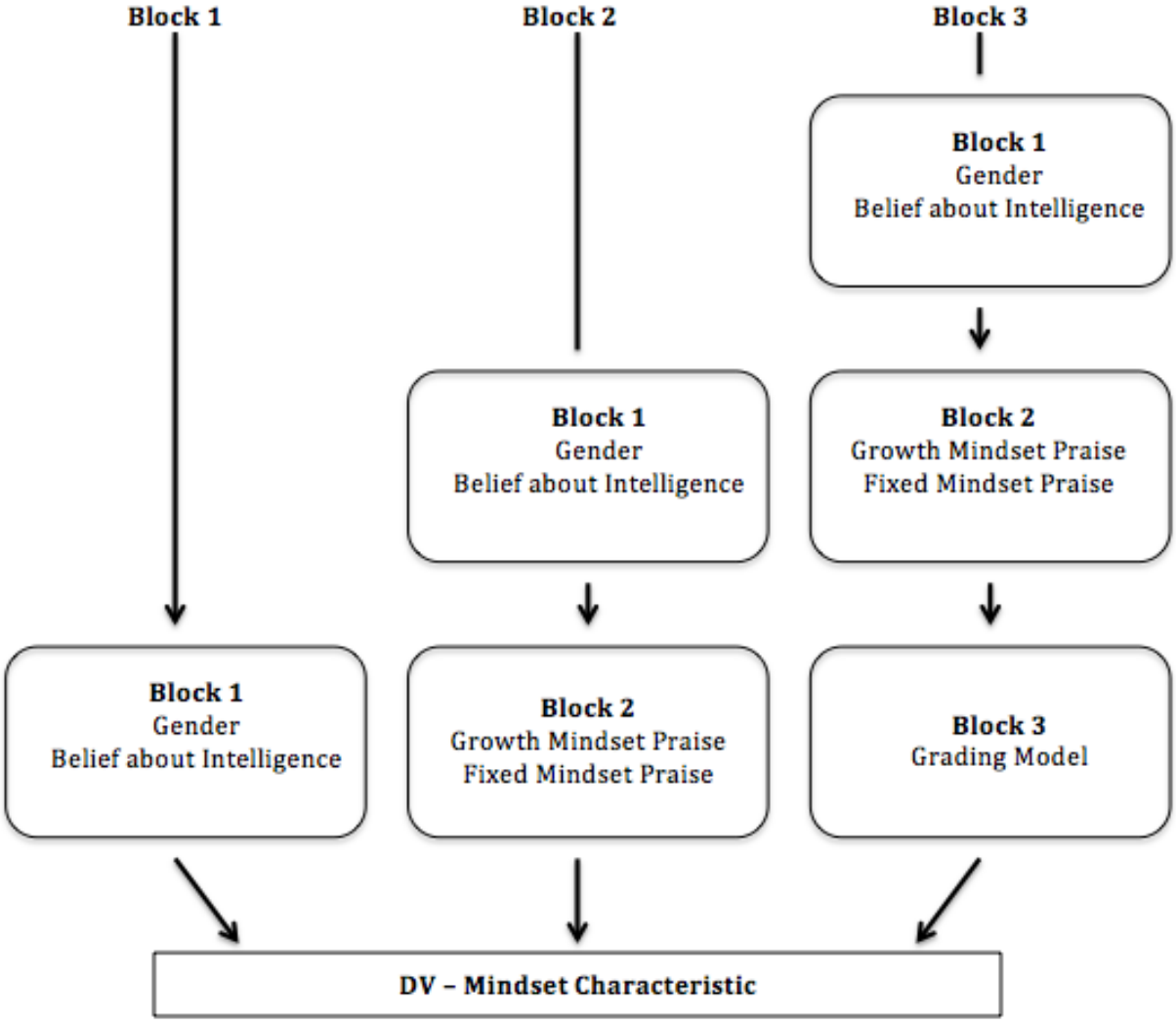

Figure 3.1. Visual Model of Multiple Hierarchical Regression Analyses for Predicting Mindset Characteristics

Delimitations

This study is delimited to seventh grade students in public middle schools in the central United States that utilize standards-based or traditional grading models. Although the survey instrument could be used in relation to other alternative grading models, it is not relevant to this study. In addition, results are limited to those of the specific demographic makeup of the school

sites and participants used in this survey. There should be little issue if future researchers wish to utilize the same framework with students of different ages or demographic makeups.

Limitations

There are a few limitations to this study. First, participants in this study all attended a suburban middle school in the Central United States. Results cannot be generalized to other geographical areas or rural/urban school districts as the sample does not represent these populations. Furthermore, the data collected were cross-sectional in nature. Since it is not longitudinal, results represent only a single point in time. Additionally, in a school utilizing a standards-based grading system, some students may still receive traditional grades if they are in an advanced math course. As such, the results may not be generalizable to students who receive a hybrid of traditional and standards-based grades.

A concern when investigating standards-based grading is the lack of a single model for use. Each school district has the autonomy to adopt its own set of guiding principles and implement its own unique alternative grading model. Consequently, results regarding the use of standards-based grading can only be generalized to districts using similar guiding principles and policies for implementation. It is also possible that teachers at the site utilizing a traditional grading model may still be using standards-based teaching practices within the classroom. However, if this were the case then there would not be differences identified in the final model.

There is also a chance that students may have been exposed to mindset training in the course of their educational career. It is possible that these students would have a disposition toward a growth mindset regardless of their grading model.

Summary

This chapter provided the proposed methodological approach for this study. Sections included review of research design, participants, data collection methods, and survey instrument. A description was provided for all independent and dependent variables included in the research questions, including the processes for factor analysis. Finally, delimitations and limitations were discussed.

CHAPTER 4

RESULTS

The purpose of this study was to determine the extent to which grading model used (traditional vs. standards-based) influenced mindset characteristics and belief about intelligence in middle school students in the Midwest. This study was informed using Dweck's (2006, 2015) work with fixed vs. growth mindset. Dweck's theory posits that the more malleable an individual perceives intelligence to be, the more likely they are to exhibit growth mindset characteristics such as increased use of coping strategies, goal setting, and perseverance in the face of challenge or failure. The hypothesis for this study was that students exposed to a standards-based grading model would be more likely to believe in the ability to increase their intelligence and thus exhibit more growth mindset characteristics.

This chapter provides results of data analyses in regard to the five research questions previously identified. This chapter is divided into five sections. The first section describes procedures used to clean the data and assure assumptions of data normality are met. The second section reports descriptive statistics on all demographic, independent, and dependent variables. The third section addresses correlations between all independent and dependent variables. Results of independent samples *t*-test conducted to answer research questions two and three are found in the fourth section. The fifth section presents sequential (hierarchical) regression analyses conducted to answer research questions four and five. The final section provides summary answers to all five research questions.

Data Screening and Assumptions of Normality

In order to prepare the data for analysis, any cases with outliers and missing values were removed from the data set. Of the 522 original cases, 99 were removed because of missing

values, leaving 423 cases remaining after data screening. These 423 cases were further assessed to ensure all variables met assumptions of normality, a key step prior to conducting inferential statistical analyses (Tabachnick & Fidell, 2007).

According to Vogt and Johnson (2011), "dependent variable values are assumed to be normally distributed at each level of the independent variable" (p. 257). This can be assessed numerically or graphically via analysis of skew and kurtosis values. Skewness refers to how symmetrically the data is distributed with the mean falling in the center, and kurtosis refers to the extent to which the data is dispersed along a bell-shaped curve (Tabachnick & Fidell, 2007). Skew and kurtosis values of zero indicate a normal distribution.

A review of the assessment of normality results for the independent and dependent variables in this study are presented in table 4.1. According to Kline (2015), extreme skew values are those exceeding an absolute value of 3.0 and extreme kurtosis values range from 8.0 to 20.0. Based on Kline's recommendation, an analysis of these scores shows all of the independent and dependent variables measured on a continuous scale and used in this study fulfill the assumptions for normality necessary for independent samples *t*-tests and hierarchical regressions.

Table 4.1

Assessment of Normality for Variables in the Model (n = 423)

Variables	Skew	SE of Skew	Kurtosis	SE of Kurtosis
Age	-.689	.119	-.373	.237
Grading Model	.052	.119	-2.007	.237
Belief about Intelligence	.254	.119	-.830	.237
Growth Mindset Effort in Reading*	-.358	.119	.404	.237
Growth Mindset Effort in Math*	-.591	.119	.556	.237

Table 4.1 (Continued)

Assessment of Normality for Variables in the Model (n = 423)

Variables	Skew	SE of Skew	Kurtosis	SE of Kurtosis
Growth Mindset Goal Setting*	-.874	.119	1.788	.237
Growth Mindset Praise*	-.510	.119	.216	.237
Fixed Mindset Praise*	-.775	.119	.689	.237
Fixed Mindset Views on Failure*	.509	.119	.096	.237

**Dependent Variables*

Frequencies and Descriptive Statistics

Descriptive statistics were run for each of the variables in this study as well as demographic information related to the participants. Table 4.2 reports the results of descriptive analyses for demographic data as well as each of the independent and dependent variables used in the study. Statistics include the range (minimum and maximum values), mean, and standard deviation for each variable.

Table 4.2

Descriptive Statistics for Demographic Data, IV, and DV Variables (n = 423)

Variables	Min	Max	*Mean*	*SD*
Age	11	14	12.73	.482
Ethnicity[a]	1	7	NA	NA
Gender (1 = Female)	0	1	.53	.500
Grading Model (1 = Standards Based Grading)	0	1	.49	.500
Belief about Intelligence[b]	1	4	2.21	.922
Growth Mindset Effort in Reading	5	20	13.60	2.765
Growth Mindset Effort in Math	5	20	14.31	3.071
Growth Mindset Goal Setting	4	16	12.58	2.129

Table 4.2 (Continued)

Descriptive Statistics for Demographic Data, IV, and DV Variables (n = 423)

Variables	Min	Max	*Mean*	*SD*
Growth Mindset Praise	5	20	15.70	2.968
Fixed Mindset Praise	3	12	9.83	1.769
Fixed Mindset Views on Failure	5	20	9.27	2.816

[a]Scale: 1 = Asian, 2 = African American, 3 = Hispanic, 4 = American Indian/Alaskan Native, 5 = Multi-Racial, 6 = Native Hawaiian/Other Pacific Islander, 7 = White
[b]Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Correlations

This study examined the relationships between variables using Pearson correlation coefficients. According to Vogt and Johnson (2011), the Pearson *r* value shows "the degree of linear relationship between two variables that have been measured on interval or ratio scales" (p. 284). Results can range from -1.0 to + 1.0; the closer the value is to .00 the less a relationship or predictability between variables is present. Should variables have a value of .90 or higher, they are said to have multicollinearity, or too high of a correlation, and are thus measuring the same concept (Tabachnick & Fidell, 2007). Green and Salkind (2011) recommend that "correlation coefficients of .10, .30, and .50, irrespective of sign, are, by convention, interpreted as small, medium, and large coefficients, respectively" (p. 259).

Pearson correlations were computed among each of the independent and dependent variables in this study. The 45 correlation coefficients are represented in Table 4.3. Data were screened for multicollinearity using Tabachnick and Fidell's (2007) recommendation of .90 or greater. No instances of multicollinearity were noted. To avoid the risk of a Type I error in determining statistical significance when computing multiple correlations, the Bonferonni approach was used to determine the new level for statistical significance. The Bonferronni

approach involves dividing a generally accepted alpha level (.05) by the number of correlations (.05/45), which results in a new alpha level (.001). In this study, correlations required a *p* value of .001 or lower to be considered significant. Using .001 as the revised and conservative significance level, 16 of the 45 correlations were deemed significant. These 16 significant correlations are noted with an asterisk (*) in Table 4.3.

Using the Green and Salkind (2011) interpretation of correlation coefficient size, of the 16 statistically significant correlations, 14 were considered to have a medium (moderate) relationship, and 2 were considered to have a large (high) relationship. In the sections below, these significant correlations are described via the strength of their relationship (coefficient size). Positive correlation indicates an increase in one variable corresponds to an increase in the other; a negative correlation indicates an increase in one variable corresponds to a decrease in the other (Green & Salkind, 2011). While there may be a statistically significant relationship between variables, it should be noted this does not indicate causation.

Table 4.3

Correlation Matrix – All Independent and Dependent Variables (n = 423)

		1	2	3	4	5	6	7	8	9
1	Age	--								
2	Gender (1 = Female)	-.126	--							
3	Grading Model (1 = SBG)	-.005	.042	--						
4	Belief about Intelligence[a]	.111	-.148	-.146	--					
5	Growth Mindset Effort in Reading	.018	.094	.082	-.182*	--				
6	Growth Mindset Effort in Math	.016	.120	.122	-.134	.616*	--			
7	Growth Mindset Goal Setting	-.005	.017	.106	-.276*	.410*	.412*	--		

Table 4.3 (Continued)

Correlation Matrix – All Independent and Dependent Variables (n = 423)

		1	2	3	4	5	6	7	8	9
8	Growth Mindset Praise	.003	-.081	-.031	-.065	.224*	.253*	.496*	--	
9	Fixed Mindset Praise	-.009	-.142	.054	-.024	.183*	.178*	.390*	.641*	--
10	Fixed Mindset Views on Failure	-.013	.124	.019	.234*	-.180*	-.143	-.443*	-.214*	-.116

Note: * $p < .001$ Bonferonni adjustment for multiple correlations to minimize chances of a Type 1 error.
[a]Scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree

High Correlations

Two correlations were considered large based on Green and Salkind's (2011) recommendations for interpreting the size of the correlation coefficient. Results for the variable growth mindset effort in math showed a high positive correlation with the variable of growth mindset effort in reading ($r = .62$, $p < .001$). This suggests participants who reported tenacity in the area of reading were also likely to report that same tenacity in the area of math. A high positive correlation also existed between fixed mindset praise and growth mindset praise ($r = .64$, $p < .001$), indicative of the logical relationship that participants who appreciated fixed mindset praise also appreciated growth mindset praise.

Moderate Correlations

Growth mindset effort in reading. A significant negative relationship was found between the variable growth mindset effort in reading and belief about intelligence ($r = -.18$, $p < .0009$), indicating as participants indicated an increased belief in the malleability of intelligence, they also indicated an increased likelihood to be persistent in the faces of challenges in the area of reading.

Growth mindset goal setting. A significant negative relationship was identified between the variable of growth mindset goal setting and belief about intelligence ($r = -.28$, $p < .0009$),

again indicating as participants reported increased belief that they have the power to change their intelligence level, they also increased their reporting of the setting challenging goals. A positive correlation was found between the variable goal setting and effort in both reading ($r = .41$, $p < .0009$) and math ($r = .41$, $p < .0009$). This reveals as participants scored higher on goal setting mindset characteristic, they also scored higher on effort in reading and math.

Growth mindset praise. Significant positive relationships were found between growth mindset praise and growth mindset effort in reading ($r = .22$, $p < .0009$), effort in math ($r = .25$, $p < .0009$), and goal setting ($r = .50$, $p < .0009$). This reveals that as students scored higher on appreciating growth mindset praise, they also scored higher on demonstrating growth mindset characteristics in the areas of effort in reading, effort in math, and goal setting.

Fixed mindset praise. Similarly, significant positive correlations were found between fixed mindset praise and growth mindset effort in reading ($r = .18$, $p < .0009$), effort in math ($r = .18$, $p < .0009$), and goal setting ($r = .39$, $p < .0009$). This reveals that as students reported higher appreciation for fixed mindset praise, they also reported higher scores regarding growth mindset characteristics of effort in reading, effort in math, and goal setting.

Fixed mindset views on failure. A positive relationship was found between the variable fixed mindset views on failure and belief about intelligence ($r = .23$, $p < .0009$). This result indicates a higher reported frequency of being bothered by failure also indicates a reported higher frequency of believing intelligence to be static. Negative correlations were found between fixed views on failure and growth mindset in the areas of effort in reading ($r = -.18$, $p < .0009$), goal setting ($r = -.44$, $p < .0009$), and praise ($r = -.21$, $p < .0009$). This logically indicates as participants' scores showed an increase in rebounding after failure, they also showed an increase in persisting in the area of reading, setting challenging goals, and appreciating praise of their

efforts.

Independent Samples *t*-tests

Seven independent samples *t*-tests were conducted to determine whether there was a difference between 7th grade middle school students' mindset characteristics and belief about intelligence based on grading model (standards-based grading vs. traditional grading practices). The seven independent samples t-tests conducted were:

2a) is there a statistically significant difference based on grading model and growth mindset effort in reading?

2b) is there a statistically significant difference based on grading model and growth mindset effort in math?

2c) is there a statistically significant difference based on grading model and growth mindset goal setting?

2d) is there a statistically significant difference based on grading model and fixed mindset views on failure?

2e) is there a statistically significant difference based on grading model and belief about intelligence?

3a) is there a statistically significant difference based on grading model and response to growth mindset praise?

3b) is there a statistically significant difference based on grading model and reporting response to fixed mindset praise?

Prior to conducting an independent samples *t*-test, three assumptions must be met:

1. Both populations must show a normal distribution in the test variable.
2. Both populations must show an equal variance of the test variable.

3. Data from the test variable must be independent of one another and representative of a random population sample (Green & Salkind, 2011, p. 176).

While data screening demonstrated the first and third assumptions were met, assumption 2 is only met if Levene's test for equality of variances reports that it is not significant. The assumption of equal variances is violated when Levene's test results reveal it is statistically significant (Green & Salkind, 2011). Such was the case with the variables belief about intelligence, fixed mindset praise, and growth mindset goal setting. In these three analyses, results were presented using values from the independent samples *t*-tests' equal variances not assumed.

Results of independent samples *t*-tests revealed three of the seven analyses produced statistically significant differences (see Table 4.4). The independent samples *t*-test conducted to determine whether there was a difference between grading models in regard to growth mindset effort in math was statistically significant, $t(421) = -2.525$, $p = .012$, with students who participated in a standards-based grading model ($M = 14.69$, $SD = 2.81$) reporting a higher growth mindset effort in math than students participating in a traditional grading model ($M = 13.94$, $SD = 3.26$). The 95% confidence interval ranged from -1.333 to -.166 with the value of zero not included in this range also indicating that the difference was statistically significant.

Results also indicated a statistically significant difference in grading model for growth mindset goal setting, $t(404.012) = -2.204$, $p = .028$, with students who participated in a standards-based grading model ($M = 12.82$, $SD = 1.82$) reporting a higher growth mindset in goal setting than students participating in a traditional grading model ($M = 12.36$, $SD = 2.36$). The 95% confidence interval ranged from -.854 to -.049 with the value of zero not included in this range also indicating that the difference was statistically significant.

Finally, results indicated a statistically significant difference in grading model regarding belief about intelligence, $t(420.878) = 3.026$, $p = .003$, with students who participated in a standards-based grading model ($M = 2.07$, $SD = .881$) reporting a stronger belief in the malleability of intelligence than students participating in a traditional grading model ($M = 2.34$, $SD = .944$). The 95% confidence interval ranged from .094 to .443 with the value of zero not included in this range also indicating that the difference was statistically significant.

All other results were not statistically significant. There were no differences in growth mindset effort in reading $t(421) = -1.686$, $p = .093$, fixed mindset views on failure $t(421) = -.397$, $p = .691$, response to growth mindset praise $t(421) = .644$, $p = .520$, or response to fixed mindset praise $t(417) = -1.109$, $p = .268$. Table 4.4 reports a summary review of results for all independent samples *t*-tests.

Table 4.4

Independent Samples t-tests – Summary of Results (n = 423)

	Traditional Grading Model		Standards Based Grading Model					Confidence Intervals	
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	Lower	Upper
Growth Effort in Reading	13.38	2.88	13.83	2.63	-1.69	421	.093	-.98	.07
Growth Effort in Math	13.94	3.26	14.69	2.81	-2.53	421	.012	-1.33	-.16
Growth Goal Setting*	12.36	2.37	12.82	1.82	-2.20	404	.028	-.85	-.05
Fixed View on Failure	9.22	3.01	9.33	2.60	-.40	421	.691	-.65	.43
Belief about Intelligence*	2.34	.94	2.07	.88	3.02	421	.003	.09	.44
Growth Praise	15.79	3.14	15.60	2.78	.64	421	.520	-.38	.75
Fixed Praise*	9.74	1.89	9.93	1.60	-1.11	417	.268	-.53	.15

Note: * Levene's test for equal variances was significant; *t*- values and df were reported using unequal variances information.

Hierarchical (Sequential) Regression

To address research questions 4 and 5, sequential hierarchical regression was used to determine whether independent variables were statistically significant predictors of the

dependent variable. Four sequential hierarchical regression analyses were conducted. Dweck's (2006, 2015) theory of fixed vs. growth mindset was used as a model to structure independent variables into three blocks. The first block contained inherent variables of gender and belief about intelligence. The second block entered contained the variables of growth mindset praise and fixed mindset praise. The third block contained grading model.

The first block was entered into the regression analyses initially due to the fact that it contained variables internal to the participant – their gender and personal beliefs regarding the malleability of intelligence. The second block contained the variables fixed and growth mindset praise because they were believed to be influences stemming from external forces such as the teacher/adult. Grading model was entered as its own block to isolate the extent to which the feedback/assessment practices in the environmental structure influenced the dependent variables (mindset characteristics). It was entered last because it is also an external variable since the environment is beyond the control of the participant. The following sections report results of the regression analyses on each of the dependent variables identified.

Growth Mindset Effort in Reading

A sequential hierarchical regression analysis was conducted on the dependent variable of growth mindset response to effort in reading. Table 4.5 provides information on the blocks in which the variables were entered into the regression analysis, the unstandardized regression coefficients (*b*), the standard error for the unstandardized regression coefficient (*SE b*), standardized regression coefficients (β), and the variance (R^2) explained for each model (block).

Person variables (block 1). Results for the regression analysis indicated that within block 1, $F(2, 420) = 8.187$, $p < .001$, belief about intelligence ($\beta = -.172$, $p < .001$) was a significant predictor of growth mindset effort in reading, accounting for only 4% (R^2=.038) of

the variance in effort in reading.

External variables (block 2). The external variables of growth mindset praise and fixed mindset praise were added to the hierarchical regression in block 2. With block 2 added to the model, results for the regression analysis indicated that gender (β = .096, p = .044), belief about intelligence (β = -.155, p = .001), and growth mindset praise (β = .165, p = .007) were statistically significant predictors of growth mindset effort in reading $F(4, 418) = 10.343$, $p <$ .001, accounting for 9% (R^2=.090) of the variance in effort in reading.

Grading Model (block 3). The variable of grading model (standards-based vs. traditional grading) was added in block 3 creating the full model. Results for the regression analysis indicated that the grading model variable was not a statistically significant predictor. Only gender (β = .095, p = .048), belief about intelligence (β = -.146, p = .002), and growth mindset praise (β = .173, p = .005) were statistically significant predictors of growth mindset effort in reading $F(5, 417) = 8.581$, $p <$ .001, accounting for 9.3% (R^2=.093) of the variance in effort in reading.

Table 4.5

Hierarchical Regression Coefficients for Effort in Reading (n = 423), R^2 = .093

Variable blocks	*b*	*SE b*	β
Internal Variables (block 1)			
Constant	14.538	.391	
Gender	.377	.268	.068
Belief about Intelligence	-.514	.145	-.172***
External Variables (block 2)			
Constant	10.583	.905	
Gender	.533	.264	.096*
Belief about Intelligence	-.463	.142	-.155*
Growth Mindset Praise	.136	.057	-.165**
Fixed Mindset Praise	.154	.096	.087
Grading Model Variable (block 3 – Full Model)			
Constant	10.390	.919	
Gender	.524	.264	.095*

Table 4.5 (Continued)

Hierarchical Regression Coefficients for Effort in Reading (n = 423), R^2 = .093

Variable blocks	*b*	*SE b*	β
Grading Model Variable (block 3 – Full Model)			
Belief about Intelligence	-.438	.143	-.146**
Growth Mindset Praise	.161	.057	.173**
Fixed Mindset Praise	.124	.096	.079
Grading Model	.319	.262	.058

Note[1]. R^2 = .038 for block 1; .090 for block 2; .093 for block 3 – full model
*Note[2]. * p < .05, ** p < .01, *** p < .001*

Growth Mindset Effort in Math

A second sequential hierarchical regression analysis was conducted on the dependent variable of growth mindset response to effort in math. Table 4.6 provides information on the blocks in which the variables were entered into the regression analysis, the unstandardized regression coefficients (*b*), the standard error for the unstandardized regression coefficient (*SE b*), standardized regression coefficients (β), and the variance (R^2) explained for each model (block).

Person variables (block 1). Results for the regression analysis indicated that within block 1, $F(2, 420) = 6.098$, $p = .002$, both gender (β = .103, $p = .035$) and belief about intelligence (β = -.119, $p = .015$) were significant predictors of growth mindset effort in math, accounting for nearly 3% (R^2=.028) of the variance in effort in math.

External variables (block 2). The external variables of growth mindset praise and fixed mindset praise were added to the hierarchical regression in block 2. With block 2 added to the model, results for the regression analysis indicated that gender (β = .131, $p = .006$), belief about intelligence (β = -.099, $p = .037$), and growth mindset praise (β = .224, $p < .001$) were statistically significant predictors of growth mindset effort in math $F(4, 418) = 10.925$, $p < .001$, accounting for 9.5% (R^2= .095) of the variance in effort in math.

Grading Model (block 3). The variable of grading model (standards-based vs. traditional grading) was added in block 3 creating the full model. Results for the regression analysis indicated that belief about intelligence was no longer a statistically significant predictor in the full model. However, gender (β = .128, p = .007), growth mindset praise (β = .238, p < .001), and grading model (β = .110, p = .020) were statistically significant predictors of growth mindset effort in math $F(5, 417) = 9.932$, $p < .001$, accounting for nearly 11% ($R^2 = .106$) of the variance in effort in math.

Table 4.6

Hierarchical Regression Coefficients for Effort in Math (n = 423), $R^2 = .106$

Variable blocks	*b*	*SE b*	β
Internal Variables (block 1)			
Constant	14.847	.437	
Gender	.631	.299	.103*
Belief about Intelligence	-.395	.162	-.119*
External Variables (block 2)			
Constant	10.100	1.003	
Gender	.805	.292	.131**
Belief about Intelligence	-.328	.157	-.099*
Growth Mindset Praise	.232	.063	.224***
Fixed Mindset Praise	.088	.106	.051
Grading Model Variable (block 3 – Full Model)			
Constant	9.692	1.013	
Gender	.785	.291	.128**
Belief about Intelligence	-.275	.158	-.083
Growth Mindset Praise	.246	.063	.238***
Fixed Mindset Praise	.063	.106	.036
Grading Model	.677	.289	.110*

Note[1]. R^2 = .028 for block 1; .095 for block 2; .106 for block 3 – full model
*Note[2]. * p < .05, ** p < .01, *** p < .001*

Growth Mindset Goal Setting

A third sequential hierarchical regression analysis was conducted on the dependent variable of growth mindset response to goal setting. Table 4.7 provides information on the blocks in which the variables were entered into the regression analysis, the unstandardized regression

coefficients (*b*), the standard error for the unstandardized regression coefficient (*SE b*), standardized regression coefficients (β), and the variance (R^2) explained for each model (block).

Person variables (block 1). Results for the regression analysis indicated that within block 1, $F(2, 420) = 17.466$, $p < .001$, belief about intelligence ($\beta = -.280$, $p < .001$) was a significant predictor of growth mindset goal setting, accounting for nearly 8% ($R^2 = .077$) of the variance in goal setting.

External variables (block 2). The external variables of growth mindset praise and fixed mindset praise were added to the hierarchical regression in block 2. With block 2 added to the model, results for the regression analysis indicated that belief about intelligence ($\beta = -.242$, $p < .001$), growth mindset praise ($\beta = .397$, $p < .001$), and fixed mindset praise ($\beta = .135$, $p = .012$) were statistically significant predictors of growth mindset goal setting $F(4, 418) = 48.453$, $p < .001$, accounting for nearly 32% ($R^2 = .317$) of the variance in goal setting.

Grading Model (block 3). The variable of grading model (standards-based vs. traditional grading) was added in block 3 creating the full model. Results for the regression analysis indicated that the grading model variable was not a statistically significant predictor. However, belief about intelligence ($\beta = -.231$, $p < .001$), growth mindset praise ($\beta = .406$, $p < .001$), and fixed mindset praise ($\beta = .124$, $p = .020$) remained statistically significant predictors of growth mindset goal setting $F(5, 417) = 39.709$, $p < .001$, accounting for 32.3% ($R^2 = .323$) of the variance in goal setting.

Table 4.7

Hierarchical Regression Coefficients for Goal Setting (n = 423), $R^2 = .323$

Variable blocks	*b*	*SE b*	β
Internal Variables (block 1)			
Constant	14.062	.295	
Gender	-.103	.202	-.024
Belief about Intelligence	-.645	.109	-.280***

Table 4.7 (Continued)

Hierarchical Regression Coefficients for Goal Setting (n = 423), R^2 = .323

Variable blocks	*b*	*SE b*	β
External Variables (block 2)			
Constant	7.684	.604	
Gender	.139	.176	.033
Belief about Intelligence	-.559	.095	-.242***
Growth Mindset Praise	.285	.038	.397***
Fixed Mindset Praise	.162	.064	.135*
Grading Model Variable (block 3 – Full Model)			
Constant	7.486	.611	
Gender	.129	.176	.030
Belief about Intelligence	-.533	.095	-.231***
Growth Mindset Praise	.292	.038	.406***
Fixed Mindset Praise	.149	.064	.124*
Grading Model	.329	.174	.077

Note[1]. R^2 = .077 for block 1; .317 for block 2; .323 for block 3 – full model
*Note[2]. * $p < .05$, ** $p < .01$, *** $p < .001$*

Fixed Mindset Views on Failure

A fourth sequential hierarchical regression analysis was conducted on the dependent variable of fixed mindset response to views on failure. Table 4.8 provides information on the blocks in which the variables were entered into the regression analysis, the unstandardized regression coefficients (*b*), the standard error for the unstandardized regression coefficient (*SE b*), standardized regression coefficients (β), and the variance (R^2) explained for each model (block).

Person variables (block 1). Results for the regression analysis indicated that within block 1, $F(2, 420) = 18.371$, $p < .001$, gender (β = .258, $p < .001$) and belief about intelligence (β = .258, $p < .001$) were significant predictors of fixed mindset views on failure, accounting for 8% (R^2 = .080) of the variance in views on failure.

External variables (block 2). The external variables of growth mindset praise and fixed mindset praise were added to the hierarchical regression in block 2. With block 2 added to the

model, results for the regression analysis indicated gender (β = .150, p = .002), belief about intelligence (β = .243, p < .001), and growth mindset praise (β = -.219, p < .001) were statistically significant predictors of fixed mindset views on failure, $F(4, 418) = 13.765$, p < .001, accounting for nearly 12% (R^2 = .116) of the variance in views on failure.

Grading Model (block 3). The variable of grading model (standards-based vs. traditional grading) was added in block 3 creating the full model. Results for the regression analysis indicated gender (β = .149, p = .002), belief about intelligence (β = .249, p < .001), and growth mindset praise (β = -.214, p < .001) were the only statistically significant predictors of fixed mindset views on failure, $F(5, 417) = 11.153$, p < .001, accounting for nearly 12% (R^2 = .118) of the variance in views on failure. Grading model was not a statistically significant predictor.

Table 4.8

Hierarchical Regression Coefficients for Views on Failure (n = 423), R^2 = .343

Variable blocks	*b*	*SE b*	β
Internal Variables (block 1)			
Constant	7.056	.390	
Gender	.916	.267	.163***
Belief about Intelligence	.787	.144	.258***
External Variables (block 2)			
Constant	9.649	.909	
Gender	.845	.265	.150**
Belief about Intelligence	.742	.142	.243***
Growth Mindset Praise	-.208	.057	-.219***
Fixed Mindset Praise	.083	.096	.052
Grading Model Variable (block 3 – Full Model)			
Constant	9.513	.923	
Gender	.839	.265	.149**
Belief about Intelligence	.760	.144	.249***
Growth Mindset Praise	-.203	.057	-.214***
Fixed Mindset Praise	.074	.097	.046
Grading Model	.226	.263	.040

Note[1]. R^2 = .284 for block 1; .341 for block 2; .343 for block 3 – full model
*Note[2]. * p < .05, ** p < .01, *** p < .001*

Summary Answers to Research Questions

In this section are answers to the five research questions asked using results from data analyses presented in this chapter.

Research Question 1 – Background Characteristics

What are the background characteristics of middle school students who participated in this study?

Participants in this study consisted of 423 students in 7th grade. Ages represented ranged from 11 to 14 (M = 12.73, SD = .48). Of these participants, 200 (47.3%) identified as male and 223 (52.7%) identified as female. The majority of participants identified their ethnicity as White (83.2%), followed by Asian (6.4%), African American (5.4%), Hispanic (1.9%), Multi-Racial (1.7%), American Indian/Alaskan Native (0.9%), and Native Hawaiian/Other Pacific Islander (0.5%). Participants were recruited from two school districts in the central United States where one district used a traditional grading approach (n = 217, 51.3%) and the other district used a standards-based grading model (n = 206, 48.7%).

Research Question 2 – Differences in Growth Mindset Characteristics

To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' mindset characteristics based on a) effort in reading, b) effort in math, c) goal setting, d) views on failure, and e) belief about intelligence?

Of the four mindset characteristics identified in the research question, two significant differences were identified. Students exposed to a standards-based grading model reported a higher frequency of growth mindset characteristics in the areas of effort in math and goal setting compared to their peers exposed to a traditional grading model. However, no significant

differences appeared in the areas of effort in reading or views on failure. Results also reveal a positive relationship between students experiencing standards-based grading and a holding a stronger belief in the malleability of intelligence. Students from a traditional grading model were more likely to report believing in an individual possessing fixed amount of intelligence.

Research Question 3 – Differences in Response to Praise

To what extent is there a statistically significant difference based on the grading models used in 7th grade middle schools (standards based grading vs. traditional grading practices) and students' response to a) growth mindset praise, and b) fixed mindset praise?

No statistically significant relationships were found between students from a traditional grading model and those from a standards-based grading model on the topic of praise. Students from the two groups showed no difference in their response to either growth mindset or fixed mindset praise

Research Question 4 – Predicting Growth Mindset Characteristics

To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a growth mindset responses for a) effort in reading, b) effort in math, and c) goal setting?

Growth mindset effort in reading. Results of the hierarchical regression analysis for the dependent variable effort in reading indicated that both internal and external variables impact the frequency of students reporting growth mindset effort in reading. In the full model, the internal variables of gender and belief about intelligence were significant, indicating being female was a predictor for showing growth mindset effort in reading. In addition, the more likely a participant was to indicate a belief in the malleability of intelligence, the more likely they were to believe

that their persistence in the area of reading would positively impact their learning. Growth mindset praise also significantly impacted the frequency of effort in reading but fixed mindset praise did not. This logically suggests that appreciating praise for effort predicts a continuation of that effort in the area of reading. Grading model was not a predictor in the full model, indicating use of a standards-based grading model did not significantly predict tenacity in reading.

Growth mindset effort in math. Results of the hierarchical regression analysis for the dependent variable effort in math revealed all three blocks contained variables that predicted an increased frequency for effort in math. The internal variable of gender was again significant with being female being a predictor of growth mindset characteristics in regard to effort in math. While belief about intelligence was a significant predictor in the first two blocks, it was not significant in the full model. External variables in block 2 again showed the more likely a student was to value praise for effort the more likely they were to persist in those efforts. The addition of grading model in block 3 was significant, suggesting that experiencing a standards-based grading model increased the likelihood of students continuing to persevere when challenged in the area of math. This was the only mindset characteristic found to be predicted by grading model.

Growth mindset goal setting. Results of the hierarchical regression analysis for the dependent variable of goal setting revealed internal and external variables to be significant predictors of goal setting. Gender did not appear as a predictor for this mindset characteristic. However, belief about intelligence did; the more likely a participant believed they could change their intelligence, the more likely they were to set and work toward challenging goals. Both fixed and growth mindset praise also positively impacted the frequency of goal setting. This suggests that any sort of praise, whether praising effort or ability, encourages students to persist and value

continuing to learn new things. The addition of grading model in block 3 was not significant, proposing that standards-based grading did not make students any more likely to set learning goals.

Research Question 5 – Predicting Fixed Mindset Response to Failure

To what extent do participants' innate person characteristics (gender and belief about intelligence), response to praise (fixed and growth mindset), and school grading model (standards based grading vs. traditional grading practices) predict a fixed mindset response to failure and mistakes?

Results of the hierarchical regression analysis for the dependent variable of views on failure revealed internal and external variables to be significant predictors of a fixed mindset response to mistakes. Data suggests females are more likely to have a negative response to internal failure whether actual or in comparison to peers. Believing intelligence to be static also increased the likelihood of students showing the fixed mindset response of hopelessness upon failure. While praise of ability (fixed mindset praise) was not a significant predictor, participants who appreciated praise of their efforts (growth mindset praise) were less likely to have a negative reaction to failure. The variable grading model in the third block did not impact the frequency of a fixed mindset response to failure, suggesting being in an environment with standards-based grading practices does not predict students' internalization of failure.

Summary

This chapter provided results for the data analysis methods described in chapter 3. Based on data analysis, assumptions of normality were met. Using the Bonferonni adjustment, 16 of the 45 correlations were statistically significant and described. Background characteristics of middle school participants were described, as well as statistically significant differences between

independent variables. The results of all four hierarchical regressions were presented. Analyses indicate significant differences in belief regarding the malleability of intelligence based on grading model. Results also suggest there are significant differences in the way students from traditional grading and standards-based grading demonstrate mindset characteristics of goal setting and effort in math. However, results suggest grading model to only be a significant predictor of the mindset characteristic effort in math. Chapter 5 provides a discussion of results and recommendations for practice and future research.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

"No matter what your ability is, effort is what ignites that ability and turns it into accomplishment."

-Carol Dweck (2006)

This chapter provides a discussion of the results presented in chapter 4, informed by the theoretical framework of the study and current literature. The chapter first offers a summary of the study, then a discussion of results as they align with the conceptual framework presented in chapter 1. Finally, implications for practice and future research are presented.

Summary of the Study

Chapter 1 provided an overview of the problem of assessment reform and a review of the complexity of the issue. The framework of mindset was introduced, as well as the purpose of the study and its research questions. Chapter 1 concluded with the significance of the study and definitions of key terms and acronyms.

Chapter 2 presented a review of the literature. It contained a history of traditional grading practices leading to the need for assessment reform. The chapter went on to explain burgeoning assessment practices with a focus on standards-based grading. Information was given on the tenets of standards-based grading and challenges in implementing this grading model. Connections were then made between the motivational impacts of standards-based grading and Dweck's work with mindset. An overview of mindset and the specific differences between a fixed and growth mindset followed, serving as the framework for this study.

Chapter 3 reviewed the methodology for the study, including a discussion of research design and methodological approach. Participants, data collection methods, and variables used in the study were each presented, as well as the results for factored constructs in relation to the

conceptual framework. Chapter 3 concluded with a review of the inferential statistical analyses used to answer each research question, delimitations, and limitations of the study.

Chapter 4 provided results of the analyses conducted. A review of methods for screening the data and establishment of assumptions of normality were explained, as well as descriptive statistics, frequencies, and correlations for each of the variables used in the study. Results of the independent samples t-tests and hierarchical regression analyses were provided. Answers to the five research questions posed in the study were presented at the end of the chapter.

The following sections in this chapter (chapter 5) discuss results as they relate to the dependent and independent variables. Implications for educational practice and future research are discussed, concluding with final thoughts on the investigation.

Discussion of the Results

As educators continue the constant quest to improve student learning, grading reform and student motivation both remain at the forefront of research influencing the national discussion (Dean, 2014; Dweck, 2015; Iamarino, 2014; Job et al., 2015; Laursen, 2015; Mensah, 2015; Muñoz & Guskey, 2015; West, Gabrieli, Finn, Kraft, & Gabrieli, 2014; Wormeli, 2014; Yan et al., 2014). Shifting to a standards-based grading model provides multiple challenges for a school as a system. For example, parents struggle interpreting grades due to a lack of cultural meaning (Guskey, Swan, & Jung, 2011), behavioral factors such as homework completion can be negatively impacted (Peters & Buckmiller, 2014), and concerns are raised regarding college entrance (Brookhart, 2011b).

Nonetheless, more and more schools are electing to make the switch to standards-based grading, even so far as some colleges are beginning to accept standards-based grades in their applications (Alvarez et al., 2014; Rier, 2013). Citing crucial concerns with traditional grading

such as the use of grades as comparison (Guskey, 2011; Stiggins, 2005; Volwerk & Tindal, 2012; Winger, 2005), the mathematical inaccuracy of zeros (Guskey, 2013; O'Connor & Wormeli, 2011; Stiggins, 2009), and the addition of behavioral elements (Cox, 2011; Marzano & Heflebower, 2011; Sadler, 2009; Wormeli, 2006b) all masking the grade being a true representation of student learning, proponents of standards-based grading continue to argue this alternative grading model addresses the myriad of concerns with traditional grading.

By shifting the focus to assessment *for* learning, standards-based grading claims to create a mastery-oriented approach through feedback and individual learning goals, both of which align with the theory of growth mindset (Burnette et al., 2013; Dweck & Leggett, 1988; Rick Stiggins, 2009). While the positive learning impacts of growth mindset have been well researched for decades (Blackwell et al., 2007; Diener & Dweck, 1978; Dweck, 1975; Henderson & Dweck, 1991; Hong et al., 1999; Molden & Dweck, 2006), little quantitative research has been done to determine whether a standards-based grading model truly impacts development of a growth mindset. The goal of this study was to determine predictors of specific growth mindset characteristics through an examination of internal and external factors such as grading model, praise, and belief about intelligence. Results suggest that each of these factors play a role in students exhibiting growth mindset characteristics. In the sections below, significant independent and dependent variables are discussed in detail in reference to the growth mindset characteristics they influence.

Gender

Results of this study indicate gender to be a predictive variable for effort in reading, goal setting, and views on failure with females being more likely to report these growth mindset characteristics. There is longstanding research documenting gender differences in regard to

mindset. For example, Ames (1984) found that women tend to see success as representative of their efforts (growth mindset), but failure as a result of not being smart (fixed mindset). Licht and Dweck (1984) also found that females who took pride in their intelligence were more likely to exhibit fixed mindset views on failure in comparison to males. Results of this study confirm these previous findings regarding females exhibiting growth mindset goal setting and effort characteristics. However, they contradict previous findings by indicating females were *less* likely to exhibit helplessness in the face of failure.

Recent research claims the gender achievement gap to be closing in the area of math and females occasionally scoring higher in the area of language (Cornwell, Mustard, & Parys, 2012; Niederle & Vesterlund, 2010; Pope & Sydnor, 2010; Scafidi & Bui, 2008; Voyer & Voyer, 2014). It would be logical, then, to speculate the gender gap in mindset could also be changing. For example, Cheema and Galluzzo (2013) found that while there was initially a "small but significant" gap in math achievement between males and females, the gap vanished once self-efficacy, a key component of mindset, was introduced into the analysis. The concept of the "helpless female" who is "bad at math" becomes increasingly antiquated as the results of this study show females being even more likely to exhibit growth mindset characteristics conducive to increased learning compared to their male counterparts.

Belief about Intelligence

Belief about intelligence was a predictive variable for three of the four growth mindset characteristic regression analyses – effort in reading, goal setting, and views on failure. The stronger a student believes they can change their intelligence, the more likely they were to exhibit these growth mindset characteristics. These findings support previous research on the theory of fixed vs. growth mindset (Mangels et al., 2006; Park & John, 2014; Romero et al.,

2014; Yan et al., 2014). In addition, students' belief about intelligence was shown to be significantly different across the two grading models with students from a standards-based model showing a stronger belief in their ability to change their intelligence. This suggests a connection between the grading model used in a classroom and students considering themselves able to increase their intelligence. Pairing results of the two analyses together supports the theory that being in a classroom using a standards-based grading model can lead to a growth mindset belief about intelligence and thus those students more strongly demonstrate growth mindset characteristics.

Praise

Fixed and growth mindset praise were both independent variables used in this study. Growth mindset praise statements from the survey instrument include appreciating being told after success with a challenging task:

- You kept at it
- You learned a lot
- You used great strategies
- You grew a lot
- You worked really hard

In contrast, high scores on fixed-mindset praise included appreciating the following statements:

- You are awesome
- You are smart
- You are good at this

The fact that neither fixed nor growth mindset praise was shown to be statistically significant between traditional and standards-based grading models suggests that students, as a

whole, appreciate any praise regardless of the type (fixed vs. growth). This is not surprising as it is human nature to seek approval.

However, growth mindset praise was a predictive variable in all four regression models while fixed mindset praise was only predictive for goal setting. When students show a strong appreciation for praise of their ability, they have a higher tendency to demonstrate tenacity in both math and reading, as well set long-term goals and maintain their sense of self-worth after failure. Dweck (2003) points out that praise becomes especially poignant around ages 10-12 as these are a critical year for social comparison. Kamins and Dweck (1999) explain,

> "Children who received feedback conveying an evaluation of themselves, their traits, or their abilities were significantly more likely than children who received effort or strategy praise to display the full complement of helpless reactions when they later met with setbacks." (p. 844)

During middle school years, praising effort over ability can have long term consequences in shaping the way students view their self-worth. Results of this study show appreciating growth mindset praise leads to an increase in multiple mindset characteristics that positively influence student learning, which aligns with findings in the literature (Dweck, 2003, 2015; McMillan et al., 2010; Mueller & Dweck, 1998; Skipper & Douglas, 2012). Interestingly, fixed mindset praise was a significant predictor only for goal setting behaviors. This finding indicates fixed mindset praise possibly has more of a likelihood to positively influence students' motivation than previous literature suggests.

Grading Model

Results of *t*-test analyses showed statistically significant differences between grading models in the area of effort in math, goal setting, and belief about intelligence with students from

a standards-based model exhibiting higher growth mindset characteristics in these areas. However, results from regression analyses show that once all other factors were accounted for, grading model was only a significant predictor in the area of effort in math. Once additional independent variables such as gender, belief about intelligence, and praise are controlled, grading model does not present as strong of a relationship. These findings suggest that while there are differences between the two groups of students based on grading model, standards-based grading no longer has a strong enough influence on its own to be predictive of growth mindset characteristics goal setting.

Math vs. Reading

Grading model in and of itself was only a predictor in one of the four regression analyses – effort in math. The results point to the significance of differences in the area of math and reading. One challenge for educators is that these two content areas approach grading differently. Math, as a content area, has more easily isolated skills that clearly build on one another; a student masters the ability to multiply two digit numbers, then solve algebraic equations, and finally graphs that equation (National Governors Association Center for Best Practices, 2010). Each skill is constructed based on mastery of the previous skill and there is a clear correct answer on the assessment. In contrast, verbal content areas such as reading and writing are often more subjective and skills are grown in tandem. For example, a student is working on their fluency, accuracy, and comprehension all while reading the same paragraph. Reading and writing are also intrinsically connected (Graham & Herbert, 2011; Perfetti & Tan, 2013), which makes it difficult to assess specific skills in isolation. These differences inevitably impact the efficacy and interpretation of the grading model.

Students also approach these content areas differently, which may impact the manner in which they exhibit mindset characteristics in each classroom. Licht and Dweck (1984) speculate these differences in content area stem from "how well a child's achievement orientations fit with the acquisition demands of the material" (p. 634). They suggest there are more difficulties to be encountered in mathematics but that those challenges are more easily avoided in verbal areas. One intent of a standards-based grading model is to make more clear specifically what students know and can do (Marzano & Heflebower, 2011), which may be more easily achieved in mathematics due to its grading being more concrete. It is possible standards-based grading provides more objective assessment items in math, translating to students having clearer feedback and a more specific skill they are challenged to overcome, thus bringing out more growth mindset behaviors.

Results of this study can only provide speculative ideas for the identified differences in content areas. Further research should be conducted in this area to determine specific differences math and reading in regard to alternative grading models. Regardless of its source, the observed differences in this study between grading models suggest standards-based grading to be all the more influential in the area of mathematics in regard to students exhibiting growth mindset characteristics critical to student learning. Therefore, it would be even more important for schools to continue a standards-based grading model throughout their middle school math curriculum, even in advanced courses.

Implications and Recommendations for Educational Practice

The results of this study indicate connections between grading models, belief about intelligence, and mindset characteristics. Each of these factors impact students at the individual,

classroom, and systemic level. By adjusting practices, policies, and procedures, educational professionals can positively influence student learning outcomes.

Classroom Level Implications and Recommendations for Teachers

Results of this study suggest a connection between mindset characteristics and grading model. Utilizing a traditional grading system that allows one opportunity to show mastery and classifies a student as "low" or "high" based on grades, GPA, or class rank further perpetuates the belief in a fixed intelligence. Results suggest teachers adopting the standards-based structure of allowing redos/retakes, offering frequent feedback, and providing multiple opportunities to demonstrate mastery can allow students to observe their own growth, thus continuing to build a belief in their ability to increase their intelligence.

Because valuing growth mindset praise was found to be a predictor of all four growth mindset characteristics, teachers should focus on providing this type of praise to students. This can be achieved in a standards-based system by utilizing comments at the end of assessments and on rubrics rather than solely a numeric point/percentage or letter grade in a traditional grading model that has a cultural significance of ability. Additionally, findings indicate that believing intelligence to be malleable is a predictor for students exhibiting growth mindset characteristics. Given previous research has shown mindset can be changed (Sciarretta & Cacciamani, 2012), educators must be cognizant of the potential influence of their casual statements on students' belief about intelligence.

Because gender also emerged as a predictive factor for exhibiting mindset characteristics, teachers must be sure to keep this variable in mind. Previous stereotypes regarding gender differences in student achievement, especially in the area of math, are becoming increasingly archaic.

Based on results of this study, the following recommendations are proposed for teachers at the classroom level:

- Adopt standards-based grading practices such as multiple opportunities to show mastery, redos/retakes on assessments, and frequent feedback so students can see the connection between their actions (mindset characteristics) and learning (standards-based grades).
- Foster growth mindset in the classroom by making explicit connections between standards-based grading principles and a growth mindset attitude toward intelligence.
- Cultivate a growth mindset toward effort through feedback. Rather than providing broad compliments that suggest innate ability such as “you’re so smart” or “you’re awesome,” educators should shift to praise such as “you worked really hard on that” or “you grew a lot” in order to swing student focus to the power of their efforts.
- Cultivate a growth mindset toward goal setting by promoting the malleability of intelligence. Statements such as, “Some students just aren’t good at math,” or, “This is as good as it is going to get” foster a belief that intelligence is static. Instead, create an environment that fosters the belief that all students can learn at high levels by encouraging growth over time with statements such as, “You really practiced that, and look how you've improved” or, “You tried different strategies and you figured out how to solve the problem.”

System Level Implications and Recommendations for Administrators

Administrators at the building and district level must be careful not to think switching to a standards-based grading system will magically create a shift in students’ belief about intelligence and their adoption of growth mindset characteristics. Grading model in and of itself was not a significant predictor for the majority of the growth mindset characteristics identified;

rather, it was students' innate belief about intelligence that emerged as a predictor of daily response to challenge. If teachers only change the manner in which student achievement is reported (the grade alone), it will likely not result in a change in mindset. Rather, educators need to change the entire way they approach assessment (formative assessment, feedback, learning targets, etc.) as a means to communicate student learning. The philosophy of standards-based grading is complex and requires a shift in the way teachers speak with students/parents, administer assessments, provide feedback, and record progress over time. Administrators must be sure to provide all of this essential professional development to their staff and ensure its daily application inside the classroom. If the shift to standards-based grading is not done with fidelity, it will have little impact in changing students' beliefs about learning. Without a change in belief about intelligence, little shift in mindset characteristics will occur.

When translating results of this study into practice, a caveat to consider is that a standards-based grading model in and of itself likely does not result in increased learning – only a more accurate representation of that learning. The question at hand becomes whether a standards-based model will also cultivate *behaviors* that increase student learning outcomes such as long-term goal setting, tenacity, rebounding from failure, and use of frequent feedback, all behaviors consistent with growth mindset. Because belief about intelligence was a predictive variable in the full regression models and grading model was not, it is worth considering whether focus at the ground level in the classroom should be shifted toward adjusting students' belief about intelligence rather than building consensus around standards-based grading.

Multiple studies have shown that it is possible to intentionally cultivate a growth mindset in students if it is actively modeled and taught (Blackwell et al., 2007; C Dweck, Walton, & Cohen, 2011; Sciarretta & Cacciamani, 2012). This shift would be much easier, require less

push-back from parents, and produce more immediate results compared to a complete overhaul of the district's assessment and reporting system as required with moving toward standards-based grading. This is not to say that grading reform is not a worthwhile endeavor and should not continue to be pursued. As educators continue to shift grading paradigms, they must keep in mind that large-scale change takes time and buy-in from all stakeholders. In order for standards-based grading to be effective, it must be implemented with fidelity; all stakeholders - students, teachers, administrators, and parents – must be on board. However, there is currently still significant pushback from communities (Erickson, 2011; Marzano, 2000; Townsley, 2014). Because study findings show belief about intelligence to be a stronger predictor than grading model, it is possible that putting an increased focus on increasing students' belief in the malleability of intelligence immediately could result in more direct results in students exhibiting the growth mindset characteristics that positively influence learning. This would allow administrators to take the time necessary to create buy-in from all stakeholders in regard to implementing standards-based grading. While focus on belief about intelligence may seem like a "small" reform effort compared to a grading system overhaul, there can be significant short and long term impact. According to Yeager and Walton (2011),

> In recent years, several rigorous, randomized field experiments have shown that seemingly "small" social-psychological interventions—typically brief exercises that do not teach academic content but instead target students' thoughts, feelings, and beliefs in and about school—have had striking effects on educational achievement even over months and years. (Yeager & Walton, 2011, p. 268)

Rather than an either/or discussion, focus should be on short term vs. long term interventions.

Based on results of this study, the following systemic recommendations are proposed for administrators at the building level:

- Provide professional development in the areas of mindset and standards-based grading practices in tandem rather than in isolation so staff can conceptualize how growth mindset frames standards-based grading practices.
- Identify opportunities for teachers to examine, debate, and struggle with the concept of standards-based grading before moving into policy, and ensure all stakeholders (parents, students, and staff) are on board before formally implementing a standards-based grading model.
- Carefully monitor standards-based grading implementation to ensure it is done with fidelity, ensuring there is a shift to growth mindset learning behaviors rather than solely a shift in grade reporting.

Recommendations for Future Research

This study contributes to the existing literature both in the area of standards-based grading and mindset. Isolating belief about intelligence and specific characteristics of mindset (effort, goal setting, views on failure, and praise), as well as measuring effort separately in both the area of math and reading are unique to this study. Because the variables effort in math and effort in reading produced different results in both *t*-tests and hierarchical regression analyses, it is suggested that future research continue to separate other mindset characteristics (goal setting, views on failure, praise, etc.) by subject area to identify whether they also produce observable differences.

This study attempted to identify which internal and external variables predicted each mindset characteristic in isolation. It is suggested that further research explore the influence of

mindset characteristics on one another in order to determine the ways in which the presence of one mindset characteristic can predict the frequency of another. For example, does an increase in goal setting predict an increase in effort?

As standards-based grading practices continue to expand to more school districts and to the high school level, replication of this study in other demographic, geographical areas, and grade levels should also be considered. This would allow for comparison across regions and student ages. Dweck (2003) theorizes belief about intelligence begins to crystalize between the ages of 10 and 12. Isolating different grade levels or using a longitudinal approach in future research would provide additional information regarding the influence of grading practices and mindset at different ages and over time.

Conclusion

Results of this study show clear connections between standards-based grading and growth mindset characteristics. By isolating individual mindset characteristics, differences between them emerged, better informing understanding of how grading model impacts each aspect of growth mindset. Results of *t*-tests showed a difference in belief about intelligence by grading model, but grading model was not shown to be a predictive variable in most of the regression analyses. However, belief about intelligence was a predictive variable. Based on these findings, belief about intelligence emerges as a key component connecting standards-based grading to growth mindset characteristics. This finding raises the concern regarding educators applying a standards-based grading model with fidelity. Some studies have found no difference between traditional and standards-based classrooms (Craig, 2011; Dean, 2014; Rosales, 2013). Theoretically, if the tenets of standards-based grading are not followed with commitment, belief about intelligence is unlikely to be shifted and there would be little increase in growth mindset

characteristics. The intended shift in student learning, the ultimate goal of the large-scale shift to an alternative grading model, would be less likely to occur. Thus, implementation becomes key in order for a shift in grading model to be effective in influencing growth mindset characteristics.

Final Thoughts

Understanding the relationship between and benefits of alternative grading models and growth mindset development can inform and support the implementation of alternative grading models designed to enhance and motivate student learning. Many communities are opposed to shifting to a standards-based grading model as it can require an overhaul of the grade reporting system (Erickson, 2011; Townsley, 2014). Most parents have grown up within a traditional grading system and resist change due to a lack of understanding and verification of its effectiveness (Marzano, 2000). However, results of this study revealed that when challenged and faced with difficulties, students who participated in a standards-based approach to grading compared with a traditional grading model demonstrated higher growth mindset responses in the areas of effort in math, belief about intelligence, and goal setting. Whereas research has supported the impact of growth mindset on positive student learning outcomes, this study provides evidence for linking grading model with the development of growth mindset characteristics.

REFERENCES

Alvarez, E., Casino, M., Flohr, S., & Suri, K. (2014). *Changing the grading system: Effects on College Admissions*.

Ames, C. (1984). Achievement attributions and self-instructions under competitive and indivudalistic goal structures. *Journal of Educational Psychology*, *76*(3), 478–487.

Anderson, R. S. (1998). Why talk about different ways to grade? The shift from traditional assessment to alternative assessment. *New Directions for Teaching and Learning*, (74), 5–16. http://doi.org/10.1002/tl.7401

Baines, L., & Stanley, G. (2006). The iatrogenic consequences of standards-based education. *The Clearing House*, *79*(3), 119–123. http://doi.org/10.3200/TCHS.79.3.119-123

Ballou, J. (2008). Surveys. In P. Lavrakas (Ed.), *Encyclopedia of survey research methods* (p. 860). Thousand Oaks, CA: SAGE Publications, Inc.

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. (2007). Implicit theories of intellignece predict achievement across an adolescent transition: A Longitudinal study and an intervention. *Child Development*, *78*(1), 246–263.

Bonner, S. M., & Chen, P. P. (2009). Teacher candidates' perceptions about grading and constructivist teaching. *Educational Assessment*, *14*(2), 57–77. http://doi.org/10.1080/10627190903039411

Brookhart, S. M. (1994). Teachers' grading: Practice and theory. *Applied Measurement in Education*, *74*(4), 279–201.

Brookhart, S. M. (2011a). Educational assessment knowledge and skills for teachers. *Educational Measurement: Issues and Practice*, *30*(1), 3–12.

Brookhart, S. M. (2011b). Starting the conversation about grading. *Educational Leadership*, 10–

14.

Burnette, J. L., O'Boyle, E. H., VanEpps, E. M., Pollack, J. M., & Finkel, E. J. (2013). Mind-sets matter: a meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin*, *139*(3), 655–701. http://doi.org/10.1037/a0029531

Butin, D. W. (2010). *The education dissertation: A guide for practicioner scholars*. Thousand Oaks, CA: Corwin.

Carey, T., & Carifio, J. (2012). The minimum grading controversy: Results from a quantitative study of seven years of grading data from an urban high school. *Educational Researcher*, *41*(6), 201–208. http://doi.org/10.3102/0013189X12453309

Check, J., & Schutt, R. K. (2012). *Research methods in education*. Thousand Oaks, CA: SAGE Publications, Inc.

Cheema, J. R., & Galluzzo, G. (2013). Analyzing the gender gap in math achievement: Evidence from a large-scale US sample. *Research in Education*, *90*, 98–112.

Conley, D. T. (2000). *Who is proficient: The relationship between proficiency scores and grades*.

Corey, S. M. (1930). Use of the normal curve as a basis for assigning grades in small classes. *School and Society*, *21*, 514–516.

Cornwell, C., Mustard, D. B., & Parys, J. Van. (2012). Noncogitive skills and the gender disparities in test scores and teacher assessments evidence from primary school. *The Journal of Human Resources*, *1*(48), 236–264.

Cox, K. B. (2011). Putting classroom grading on the table: A reform in progress. *American Secondary Education*, *40*(1), 67–88.

Craig, T. A. (2011). *Effects of standards-based report cards on student learning*. Northeastern University.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Cronk, B. (2014). *How to use SPSS* (8th ed.). Glendale, CA: Pryczak Publishing.

Crotty, M. J. (1998). *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: SAGE Publications, Inc.

Dean, M. G. (2014). *Grade retention rates: Impact of standards-based grading as compared to a traditional grading system in 3rd and 5th grades*. Liberty University.

Diener, C. I., & Dweck, C. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology*, *36*(5), 451–462.

Doron, J., Stephan, Y., Boiché, J., & Le Scanff, C. (2009). Coping with examinations: Exploring relationships between students' coping strategies, implicit theories of ability, and perceived control. *British Journal of Educational Psychology*, *79*, 515–528. http://doi.org/10.1348/978185409X402580

Dueck, M. (2011). How I broke my own rule and learned to give retests. *Education Leadership*, (November), 72–75.

DuFour, R. (2002). The learning-centered principal. *Education Leadership*, *59*(8), 12–15.

Dweck, C. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology*, *31*(4), 674–685.

Dweck, C. (1986). Motivational Processes Affecting Learning. *The American Psychologist*, *41*(10), 1040–1048.

Dweck, C. (2003). Ability conceptions, motivation, and development. *Development and Motivation*, *2*, 13–27.

Dweck, C. (2006). *Mindset: The new psychology of success*. New York, NY: Random House.

Dweck, C. (2015). *Self-theories: Their role in motivation, personality, and development* (2nd ed.). New York, NY: Psychology Press.

Dweck, C., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273.

Dweck, C., & Reppucci, N. D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology*, *25*(1), 109–116.

Dweck, C., Walton, G. M., & Cohen, G. L. (2011). *Academic tenacity: Mindset and skills that promote long-term learning*. Seattle, WA. Retrieved from http://web.stanford.edu/~gwalton/home/Welcome_files/DweckWaltonCohen_2014.pdf

Education, U. S. D. of. (2016). No Child Left Behind. Retrieved January 11, 2016, from http://www2.ed.gov/nclb/landing.jhtml

El-alayli, A., & Baumgardner, A. (2003). If at first you don't succeed, what makes you try, try again? Effects of implicit theories of ability feedback in a performance-oriented climate. *Self and Identity*, *2*(January 2001), 119–135. http://doi.org/10.1080/15298860390129881

Elliott, E. S., & Dweck, C. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, *54*, 5–12.

Erickson, J. A. (2010). Grading practices: The third rail. *Principal Leadership*, (March), 22–26.

Erickson, J. A. (2011). How grading reform changed our school. *Educational Leadership*, (November), 66–70.

Fisher, D., Frey, N., & Pumpian, I. (2011). No penalities for practice. *Educational Leadership*, (November), 46–51.

Fowler, F. J. (2014). *Survey research methods* (5th ed.). Boston: SAGE.

Goodwin, B. (2003). Digging deeper: Where does the public stand on standards-based education? *Mid-Continent Research for Education and Learning*, (July).

Graham, S., & Herbert, M. (2011). Writing to Read: A Meta-Analysis of the Impact of Writing and Writing Instruction on Reading. *Harvard Educational Review*, *81*(4), 710–744.

Green, S. B., & Salkind, N. J. (2011). *Using SPSS for Windows and Macintosh: Analyzing and understanding data*. Upper Saddle River, NJ: Pearson Education Inc.

Guskey, T. (2001). Helping standards make the grade. *Educational Leadership*, *59*(1), 20–27.

Guskey, T. (2006). Making high school grades meaningful. *Phi Delta Kappan*, *87*(9), 670–675.

Guskey, T. R. (1994). Making the grade: What benefits students? *Educational Leadership*, 14–20.

Guskey, T. R. (2009). *Bound by tradition: Teachers' views of crucial grading and reporting issues*. Lexington, KY.

Guskey, T. R. (2009). *Practical solutions for serious problems in standards-based grading*. Thousand Oaks, CA: Corwin.

Guskey, T. R. (2011). Five obstacles to grading reform. *Educational Leadership*, 17–21.

Guskey, T. R. (2013). The case against the percentage grades. *Educational Leadership*, (September), 68–72.

Guskey, T., Swan, G., & Jung, L. A. (2010). Developing a statewide, standards-based student report card: A review of the Kentucky initative. Denver, CO: American Educational Research Association.

Guskey, T., Swan, G. M., & Jung, L. A. (2011). Grades that mean something. *Phi Delta Kappan International*, (October 2011), 52–58.

Hamilton, L. S., Stecher, B. M., & Yuan, K. (2008). *Standards-based reform in the United*

States: History, research, and future directions. *RAND Corporation*. Washington, D.C.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York, NY: Routledge.

Henderson, V., & Dweck, C. (1991). Adolescence and achievement. In S. Feldman & G. Elliott (Eds.), *At the threshold: Adolescent development* (pp. 197–216). Cambridge, MA: Harvard University Press.

Hong, Y., Dweck, C., Lin, D. M., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, *77*(3), 588–599.

Iamarino, D. L. (2014). The benefits of standards-based grading: A critical evaluation of modern grading practices, *17*(2), 1–12.

Institute of Education Services, & U.S. Department of Education. (2013). *A first look: 2013 mathematics and reading*. Washington, D.C.

Job, V., Walton, G. M., Bernecker, K., & Dweck, C. (2015). Implicit theories about willpower predict self-regulation and grades in everyday life. *Journal of Personality and Social Psychology*, *108*(4), 637–647.

Johnson, R. H. (1918). Educational research and statistics: The coefficient marking system. *School and Society*, *7*(181), 714–716.

Jones, J. (2013). A better grading system: Standards-Based, student-centered assessment. *English Journal*, *1*, 111–118.

Jung, L. A., & Guskey, T. R. (2007). Standards-based grading and reporting: A model for special education. *Council for Exceptional Children*, 47–53.

Kamins, M. L., & Dweck, C. (1999). Person versus process praise and criticism: Implications for

contingent self-worth and coping. *Developmental Psychology*, *35*(3), 835–847.

Klein, A. (2014, September 23). Historic summit fueled push for K-12 standards. *Education Week*, pp. 18–20. Retrieved from http://www.edweek.org/ew/articles/2014/09/24/05summit.h34.html

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: The Guilford Press.

Laursen, E. K. (2015). The power of grit, perseverance, and tenacity. *Reclaiming Chidlren and Youth*, *23*(4), 19–24.

Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental Psychology*, *20*(4), 628–636. http://doi.org/10.1037/0012-1649.20.4.628

Lubienski, S. T. (2004). Traditional or standards-based mathematics? The choices of students and parents in one district. *Journal of Curriculum and Supervision*, *19*(4), 338.

Mangels, J. A., Butterfield, B., Lamb, J., Good, C., & Dweck, C. (2006). Why do beliefs about intelligence influence learning success? A social cognitive neuroscience model. *Social Cognitive and Affective Neuroscience*, *1*(2), 75–86. http://doi.org/10.1093/scan/nsl013

Marzano, R. J. (2000). *Transforming Classroom Grading*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R. J., & Heflebower, T. (2011). Grades that show what students know. *Educational Leadership*, 34–39.

McMillan, J., Cohen, J., Abrams, L., Cauley, K., Pannozzo, G., & Hearn, J. (2010). *Understanding secondary teachers' formative assessment practices and their relationship to student motivation*. Virginia Commonwealth University.

McMillan, J. H., & Nash, S. (2000). Teacher classroom assessment and grading practices decision making, 39.

McTighe, J., & Tomlinson, C. A. (2006). *Integrating differentiated instruction and understanding by design: Connecting content and kids*. Alexandria, VA: Association for Supervision & Curriculum Development.

Melograno, V. J. (2007). Grading and report cards for standards-based physical education. *Journal of Physical Education, Recreation, and Dance*, *78*(6), 45–53.

Mensah, E. (2015). Middle Level Students' Goal Orientations and Motivation. *Journal of Education and Training Studies*, *3*(2), 20–33. http://doi.org/10.11114/jets.v3i2.617

Mertens, D. M. (2009). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Mertler, C. A., & Vannatta, R. A. (2013). *Advanced and multivariate statistical methods: Practical application and interpretation*. (J. Petit, M. Lopez, & D. Dobies, Eds.) (5th Editio). Glendale: Pyrczak Publishing.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Los Angeles, CA: SAGE Publications, Inc.

Molden, D. C., & Dweck, C. (2006). Finding "meaning" in psychology: A lay theories approach to self-regulation, social perception, and social development. *The American Psychologist*, *61*(3), 192–203. http://doi.org/10.1037/0003-066X.61.3.192

Mueller, C. M., & Dweck, C. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, *75*(1), 33–52.

Munk, D. D., & Bursuck, W. D. (2001). What report cards should and do communicate.

Remedial and Special Education, *22*(5), 280–287.

Muñoz, B. M. A., & Guskey, T. R. (2015). Standards-based grading and reporting will improve education. *Phi Delta Kappan*, *96*(April), 64–68.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform, a report to the Nation and the Secretary of Education, United States Department of Education*. Washington, D.C.

National Governors Association Center for Best Practices. (2010). *Common Core State Standards*. Washington, D.C.

Niederle, M., & Vesterlund, L. (2010). Explaining the gender gap in math test scores : The role of competition. *Journal of Economic Perspectives*, *24*(2), 129–144.

O'Connor, K., & Wormeli, R. (2011). Reporting student learning. *Educational Leadership*, 40–44.

Ommundsen, Y., Haugen, R., & Lund, T. (2005). Academic self-concept, implicit theories of ability, and self-regulation strategies. *Scandinavian Journal of Educational Research*, *49*(5), 461–474. http://doi.org/10.1080/00313830500267838

Park, J. I. K., & John, D. R. (2014). I think I can, I think I can: Brand use, self-efficacy, and performance, *LI*(April), 233–247.

Perfetti, C. A., & Tan, L.-H. (2013). Write to read: The brain's universal reading and writing network. *Trends in Cognitive Sciences*, *17*(2), 56–57.

Peters, R., & Buckmiller, T. (2014). Our grades were broken: Overcoming barriers and challenges to implementing standards-based grading. *Journal of Educational Leadership in Action*, *2*(2).

Pope, D. G., & Sydnor, J. R. (2010). Geographic variation in the gender differences in test

scores. *Journal of Economic Perspectives*, *24*(2), 95–108.

Popham, W. J., & Husek, T. R. (1969). Criterion-referenced Measurement. *Journal of Educational Measurement*, *6*(1), 1–9.

Post, S. L. (2014). Standards-Based grading in a fluid mechanics course. In *121st ASEE Annual Conference & Exposition*. Indianapolis, IN: American Society for Engineering Education.

Randall, J., & Engelhard, G. (2009). Differences between teachers ' grading practices in elementary. *The Journal of Educational Research*, *102*(3), 175–185.

Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: A comprehensive guide* (4th ed.). San Francisco: Jossey-Bass.

Reeves, D. (2004). The case against the zero. *Phi Delta Kappan*, 324–325.

Reeves, D. (2011). Taking the grading conversation public. *Educational Leadership*, 76–79.

Rier, J. (2013, October 17). Successful transition to proficiency-based diploma starts now. *Maine Department of Education*.

Romero, C., Master, A., Paunesku, D., Dweck, C., & Gross, J. J. (2014). Academic and emotional functioning in middle school: The role of implicit theories. *Emotion*, *14*(2), 227–234. http://doi.org/10.1037/a0035490

Rosales, R. B. (2013). *The effects of standards-based grading on student performance in Algebra 2*. Western Kentucky University.

Sadler, D. R. (2009). Grade integrity and the representation of academic achievement. *Studies in Higher Education*, *34*(7), 807–826. http://doi.org/10.1080/03075070802706553

Scafidi, T., & Bui, K. (2008). Gender similarities in math performance from middle school through high school. *Journal of Instructional Psychology*, *1990*, 252–256.

Schoen, H. L., Cebulla, K. J., Finn, K. F., & Fi, C. (2003). Teacher variables that relate to

student achievement when using a standards-based curriculum. *National Council of Teachers of Mathematics*, *34*(3), 228–259.

Sciarretta, C., & Cacciamani, S. (2012). Modifying one's own theory of intelligence: When believing in "flying donkeys" helps one to grow. *Journal of Applied Psychology*, *264*, 3–14.

Scott, S. (2005). What's in a grade. *General Music Today*, *18*(2), 17–24.

Scriffiny, P. L. (2008). Seven reasons for grading. *Educational Leadership*, (October), 70–75.

Shippy, N., Washer, B., & Perrin, B. (2013). Teaching with the end in mind: The role of standards-based grading. *Journal of Family & Consumer Sciences*, *105*(2), 14–16. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=89484658&site=ehost-live

Skipper, Y., & Douglas, K. (2012). Is no praise good praise? Effects of positive feedback on children's and university students' responses to subsequent failures. *The British Journal of Educational Psychology*, *82*, 327–339. http://doi.org/10.1111/j.2044-8279.2011.02028.x

Souter, D. H. (2009). *The nature of feedback provided to elementary students in classrooms where grading and reporting are standards-based*. Georgia State University.

Spencer, K. (2012). Standards-Based grading. *Education Digest*, *78*(3), 4–10. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=82981845&site=ehost-live

Stiggins, R. (2004). New assessment beliefs for a new school mission. *Phi Delta Kappan*, 22–27.

Stiggins, R. (2005). From formative assessment to assessment for learning: A path to success in standards-based schools. *Phi Delta Kappan International*, *87*(4), 324–328.

Stiggins, R. (2009). Assessment upper elementary FOR learning. *The Phi Delta Kappan*, *90*(6),

419–421.

Stiggins, R., & Duke, D. (2008). Effective instructional leadership requires assessment leadership. *Phi Delta Kappan*, (December 2008), 285–292. http://doi.org/10.1177/003172170809000410

Stiggins, R. J. (1991). Facing the challenges of a new era of educational assessment. *Applied Measurement in Education*, *4*(4), 263–273.

Sue, V. M., & Ritter, L. A. (2007). *Conducting online surveys*. Thousand Oaks, CA: SAGE.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th editio). Boston, MA: Allyn & Bacon.

Tabachnick, B. G., & L. S. Fidell. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn & Bacon.

Thompson, S. (2001). The authentic standards movement and its evil twin. *The Teachers, Schools, and Society Reader*, *10*(3), 1–6.

Tollefson, N. (2000). Classroom applications of cognitive theories of motivation. *Educational Psychology Review*, *12*(1), 63–84.

Tomlinson, C. A. (2000). Reconcilable differences? Standards-based teaching and differentiation. *Educational Leadership*, *58*(1), 6–11.

Tomlinson, C. A. (2001). Grading for success. *Educational Leadership*, 12–15.

Townsley, M. (2014). Redesigning grading — Districtwide. *Educational Leadership*, 68–71.

U.S. Department of Education. (2016). Race to the Top Fund. Retrieved January 11, 2016, from http://www2.ed.gov/programs/racetothetop/index.html

Urich, L. J. (2012). *Implementation of standards-based grading at the middle school level*. Iowa State University.

US Department of Education. (2015). Competency-based learning or personalized learning. Retrieved from http://www.ed.gov/oii-news/competency-based-learning-or-personalized-learning

Vogt, W. P., & Johnson, R. B. (2011). *Dictionary of statistics and methodology* (4th ed.). Los Angeles, CA: SAGE Publications, Inc.

Volwerk, J. J., & Tindal, G. (2012). Documenting student performance. *Journal of College Admission*, 17–23.

Voyer, D., & Voyer, S. D. (2014). Gender differences in scholastic achievement : A meta-analysis. *American Psychological Association*, *140*(4), 1174–1204.

Waltman, K. K., & Frisbie, D. A. (1994). Parents' understanding of their children's report card grades. *Applied Measurement in Education*, *7*(3), 223–240.

Wang, L., & Brown, L. (2006). Controversies of standardized assessment in school accountability reform : A critical synthesis of multidisciplinary research evidence. *Applied Measurement in Education*, *19*(4), 305–328.

Wenz-Gross, M., Brennan, R. T., Kim, J., & Siperstein, G. N. (2001). The relative equitability of high-stakes testing versus teacher-assigned grades: An analysis of the Massachusetts Comprehensive Assessment System (MCAS). *Harvard Educational Review*, *71*(2), 173–217.

West, M. R., Gabrieli, C. F. O., Finn, A. S., Kraft, M. A., & Gabrieli, J. D. E. (2014). What effective schools do. *Education Next*, *14*(4), 72–79.

Wilson, S. M., & Floden, R. E. (2001). Hedging bets: Standards-based reform in classrooms. In S. H. Fuhrman (Ed.), *From the capitol to the classroom: Standards-based reform in the states* (pp. 193–216). Chicago, IL: The University of Chicago Press.

Winger, T. (2005). Grading to communicate. *Educational Leadership*, 61–65.

Wong, M. M. (2008). Perceptions of parental involvement and autonomy support: Their relations with self-regulation, academic performance, substance use and resilience among adolescents. *North American Journal of Psychology*, *10*(3), 497–518.

Wormeli, R. (2006a). Accountability: Teaching through assessment and feedback, not grading. *American Secondary Education*, *34*(3), 14–28.

Wormeli, R. (2006b). *Fair isn't always equal: Assessing and grading in the differentiated classroom*. Portland, ME: Stenhouse Publishers.

Wormeli, R. (2011). Redos and retakes done right. *Educational Leadership*, 22–26.

Wormeli, R. (2014). Motivating young adolescents. *Educational Leadership*, 26–32.

Yan, V. X., Thai, K.-P., & Bjork, R. a. (2014). Habits and beliefs that guide self-regulated learning: Do they vary with mindset? *Journal of Applied Research in Memory and Cognition*, *3*(3), 140–152. http://doi.org/10.1016/j.jarmac.2014.04.003

Yeager, D. S., & Walton, G. M. (2011). Social-Psychological interventions in education: They're not magic. *Review of Educational Research*, *81*(2), 267–301. http://doi.org/10.3102/0034654311405999

APPENDIX A

Survey Instrument

Directions: Please read these directions carefully and ask questions if you are unsure how to answer.

Q1 What is your five digit student ID number?

Q2 What is your gender?
- ❍ Male (1)
- ❍ Female (2)

Q3 What is your age?
- ❍ 10 years old (1)
- ❍ 11 years old (2)
- ❍ 12 years old (3)
- ❍ 13 years old (4)
- ❍ 14 years old (5)
- ❍ 15 years old (6)

Q4 When you are successful with a challenging task, to what extent do you like to be told...

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
You are smart (1)	❍	❍	❍	❍
You worked really hard (2)	❍	❍	❍	❍
You are awesome (3)	❍	❍	❍	❍
You grew a lot (4)	❍	❍	❍	❍
You kept at it (5)	❍	❍	❍	❍
You used great strategies (6)	❍	❍	❍	❍
You are good at this (7)	❍	❍	❍	❍
You have learned a lot (8)	❍	❍	❍	❍

Q5 This question is specifically about the subject of reading. When trying to learn something new in reading and you find it difficult or challenging, to what extent do you respond by…

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
Getting frustrated (1)	❍	❍	❍	❍

Asking clarifying questions (2)	❍	❍	❍	❍
Getting angry (3)	❍	❍	❍	❍
Complaining (4)	❍	❍	❍	❍
Trying harder (5)	❍	❍	❍	❍
Feeling stupid (6)	❍	❍	❍	❍
Asking for help from a friend (7)	❍	❍	❍	❍
Asking for help from an adult (8)	❍	❍	❍	❍
Stopping or giving up (9)	❍	❍	❍	❍
Trying a different strategy (10)	❍	❍	❍	❍
Feeling helpless (11)	❍	❍	❍	❍

Q6 This question is specifically about the subject of math. When trying to learn something new in math and you find it difficult or challenging, to what extent do you respond by…

	Strongly disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
Getting frustrated (1)	❍	❍	❍	❍
Asking clarifying questions (2)	❍	❍	❍	❍
Getting angry (3)	❍	❍	❍	❍
Complaining (4)	❍	❍	❍	❍
Trying harder (5)	❍	❍	❍	❍
Feeling stupid (6)	❍	❍	❍	❍
Asking for help from a friend (7)	❍	❍	❍	❍
Asking for help from an adult (8)	❍	❍	❍	❍
Stopping or giving up (9)	❍	❍	❍	❍
Trying a different strategy (10)	❍	❍	❍	❍
Feeling helpless (11)	❍	❍	❍	❍

Q7 Indicate to what extent you agree or disagree with the following statements

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
Even if I don't do well at first, I will use the feedback I get to do better next time (1)	❍	❍	❍	❍
I prefer work when I can do it perfectly without any mistakes (2)	❍	❍	❍	❍
I have fun taking on a challenging task (3)	❍	❍	❍	❍
One of my goals is to look smart in comparison to the other students in my class (4)	❍	❍	❍	❍
It's important to me that I learn a lot of new concepts this year (5)	❍	❍	❍	❍
When something is hard for me to do, I usually keep trying (6)	❍	❍	❍	❍

Q8 Indicate to what extent you agree or disagree with the following statements

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
It's important to me that my teacher thinks I am good at my class work (1)	❍	❍	❍	❍
It's important to me that I finish the test before other people (2)	❍	❍	❍	❍
If I don't learn something quickly, I feel like I'm not smart (3)	❍	❍	❍	❍
If I make mistakes, I feel unhappy with myself as a person (4)	❍	❍	❍	❍
If I have to work hard on something, I feel like I'm getting smarter (5)	❍	❍	❍	❍
If I don't do well on a test, I feel like I'm not smart (6)	❍	❍	❍	❍
If I don't learn something quickly, I give up (7)	❍	❍	❍	❍

Q9 Indicate to what extent you agree or disagree that the following types of feedback are important to you.

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
Final grade (letter- A/B/C/D/F) (1)	❍	❍	❍	❍
Final percentage (number - 70%/80%/90%/100%) (2)	❍	❍	❍	❍
Scores on a rubric (3)	❍	❍	❍	❍

Teacher comments next to my final grade/rubric (4)	❍	❍	❍	❍
Teacher comments inside of my work (5)	❍	❍	❍	❍

Q10 Being smart is something you are born with.
- ❍ Strongly disagree (1)
- ❍ Disagree (2)
- ❍ Agree (3)
- ❍ Strongly Agree (4)

Q11 If you work hard, you can change your level of intelligence.
- ❍ Strongly Disagree (1)
- ❍ Disagree (2)
- ❍ Agree (3)
- ❍ Strongly Agree (4)

Q12 You can learn new things, but you cannot really change your basic intelligence.
- ❍ Strongly Disagree (1)
- ❍ Disagree (2)
- ❍ Agree (3)
- ❍ Strongly Agree (4)

Q13 If you don't learn something quickly, you are not smart.
- ❍ Strongly Disagree (1)
- ❍ Disagree (2)
- ❍ Agree (3)
- ❍ Strongly Agree (4)

Q14 There are some things some people just can't learn.
- ❍ Strongly Disagree (1)
- ❍ Disagree (2)
- ❍ Agree (3)
- ❍ Strongly Agree (4)

Q15 What is the first thing you look at when you get your work back?

Q16 What do you do with the feedback you receive from teachers on your work?

Q17 How do you feel if you are one of the last people to turn in a test?

Q18 What is your favorite class?

Q19 Why is this your favorite class?

Q20 What is your least favorite class?

Q21 Why is this your least favorite class?

Q22 On a scale of 1 to 10 (1 meaning you never heard of it, 5 you know the differences between fixed and growth mindset, and 10 being you are an expert in it), how familiar are you with the characteristics of a fixed vs. growth mindset?

- 1 (never heard of it) (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (know the differences between fixed and growth mindset) (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (expert in it) (10)