The Effects of Standards-Based Grading and Differentiated Reassessment on the Metacognition, Motivation, and End of Course Assessments of 9th Grade American History Students

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DEDICATION

To **Ray**.

Weather.

Golf.

Tomatoes.

And Otterbein.

I miss our conversations.

ACKNOWLEDGEMENTS

- To my **wife**. With this degree, I am done… until the next one.
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VITAE

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ABSTRACT

This study attempts to determine whether Mastery Learning (with differentiated reassessment) and Mastery Teaching (within a standards-based curriculum) had a 1) metacognitive and/or motivational effect on how students perceive their learning and 2) whether or not Mastery Teaching had an impact on their mastery of the material when compared to students assessed in more traditional classrooms that did not offer reassessment. Using a standard district American History exam given pre- and post-semester and two student learning and motivation surveys (SMQII and PRO-SDLS), the results showed that being taught in a social studies classroom that utilizes differentiated reassessment and Standards-Based Grading (SBG) does not have a statistically significant metacognitive effect but does have a motivational effect (in particular *grade* motivation) on non-honors students (U = 1,318, p = .026). Additionally, it was found that students in a SBG classroom produced higher gains on the American History assessment than non-SBG students (t = 1.679, p = .121). Potential interpretations and implications are discussed.

SECTION ONE

Introduction

Motivating 14 and 15-year-olds to take an interest in the Magna Carta, the Cold War, and the Election of 2016 – while getting them to learn state content material – is arguably one of the most important things I do on a daily basis. In fact, it was something I set out to accomplish long before I started reading about "why" teachers should. That being said, teaching the same students how to reflect on their educational experiences and developing their ability to identify academic strengths and weaknesses, however, proved to be a bit more challenging. As a result, there was a natural gravitation toward developing metacognitive practices within my classroom when it came to the informational feedback following class assessments. This was a key component of a major grading transformation within my own classroom that resulted in the implementation of Standards-Based Grading (SBG) in 2008. Combining both Mastery Learning and Mastery Teaching practices created differentiated reassessments that now allow me to synthesize student progress and create meaningful units tied to learning targets.

In education, grades are often extrinsic motivators, meaning their power to influence student behavior originates from *outside* the student (O'Connor, 2007). Many teachers, parents, and guardians, however, inadvertently use grades as extrinsic motivators when they say things like, "If you do not get a B or better on your math quiz, then you are not allowed to go to the football game." Students often struggle to reach many of these imposed goals because they lack intrinsic motivation, meaning their desire to achieve and improve needs to come from within. To help students, teachers must motivate students toward goal acceptance (Wiggins, 2012). If the end-product is content mastery, then that needs to become the student's goal and not just the teacher's. In other words, NBA All-Star Shaquille O'Neal had to *want* to be a better free throw

shooter; Coach Phil Jackson could not want it *for* him (Knoblauch, 2015). The importance of intrinsic motivation and the fact that students are more likely to complete a task they enjoy doing corresponds beautifully with "creative" assignments. Of course, assignments tied to extrinsic motivators undermine intrinsic motivation (Wiggins, 2012). Since schools, guardians, and teachers constantly use grades as extrinsic motivators, it is no wonder students become disengaged. Thus, as educators and administrators think about current and future grading practices, it is important to look at what does and does not motivate students (O'Connor, 2007).

Metacognition, which is the ability to properly evaluate one's own learning and thought process (Weimer, 2013), is two-fold and includes mindfulness of one's thinking and learning as well as a critical awareness of oneself as a thinker and learner (Chick, Karris, & Kernahan, 2009; Hatano & Inagaki, 1986). Through reflection, students that know their strengths and weaknesses as writers, readers, test-takers, and overall learners are more likely to monitor their learning (Bransford, Brown, & Cocking, 2000). By educating students about effective problem-solving strategies and discussing the cognitive and motivational characteristics of thinking, teachers shift accountability for monitoring learning to their students (Paris & Winograd, 1990).

As a teacher who uses a standards-based curriculum to create differentiated reassessments, and as a firm believer in having students reflect on how they did after the initial assessment, I was particularly interested in seeing if these practices truly had metacognitive and motivating effects on how my students perceived their learning. Did this impact their mastery of the material when compared to students assessed in more traditional classrooms that do not offer reassessment or assessment reflection?

The Purpose of the Study

The primary purpose of this instructional inquiry project was to determine if my use of Mastery Learning (that includes differentiated reassessment) and Mastery Teaching (that operates with a standards-based curriculum) had a 1) metacognitive and/or motivational effect on how my students perceive their learning and 2) whether or not Mastery Teaching had an impact on their mastery of the material when compared to students assessed in more traditional classrooms that did not offer reassessment.

Data for this research were collected using a motivational survey and a self-directed learning survey given to all mainstreamed 9th grade American History classes. These surveys asked about student perception, satisfaction, and motivation concerning learning with respect to their American History classrooms. Additionally, data collected from district-created, district-approved, and district-mandated Start of Course Assessments (SOCA) and End of Course Assessments (EOCA) for the 9th grade American History classes were used. A thorough examination of survey results and SOCA/EOCA data helped draw conclusions about the effectiveness of differentiated reassessment.

The Research Questions

This study addressed three research questions. These questions were:

1. Does being taught in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum have a *metacognitive* effect on how 9th grade students perceive their learning?

2. Does being taught in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum have a *motivational* effect on how 9th grade students perceive their learning?

3. Does Mastery Teaching have an impact on the mastery of the material by 9th grade students when compared to students assessed in more traditional classrooms that do not offer reassessment?

SECTION TWO

Literature Review

Introduction

The primary purpose of this instructional inquiry project was to determine if my use of Mastery Learning (that includes differentiated reassessment) and Mastery Teaching (that operates with a standards-based curriculum) had a metacognitive and/or motivational effect on how my students perceive their learning and whether or not Mastery Teaching had an impact on their mastery of the material when compared to students assessed in more traditional classrooms that did not offer reassessment. In Section One, there was an overview of the study with information regarding the scope, purpose, and significance of the study. Section Two contains an appraisal of the current literature and examines student-centered approaches to education (including Mastery Learning, Mastery Teaching, differentiation, and Standards-Based Grading) and metacognition and motivation as it pertains to student self-reflection and self-efficacy in social studies classes.

Mastery Learning and Mastery Teaching

Two of the most important contributions to student-centered learning come in the form of "Mastery Learning," as proposed by Benjamin Bloom (1968), and in Madeline Hunter's "Mastery Teaching" (1982). The basic philosophical foundation of Bloom's Mastery Learning (originally known as "Learning for Mastery") is that all students are fully capable of learning (Guskey, 1988). The caveat to this quasi-guarantee that all students can learn, however, is that it can only happen if these students are placed in the right circumstances and in an environment that can foster such educational gains (Anderson & Block, 1977). Bloom (1968) argued that such a setting can be achieved if students are required to attain "mastery" before moving forward in

their course material. A classroom that emphasizes learning over grades (and one that allows students to mature academically at a sensible pace) helps students validate their education (DeKeyrel, Dernovish, Epperly, & McKay, 2000). Guskey (1987) determined that Bloom's "mastery" piece is made up of two key components, both of which are absolutely fundamental for Mastery Learning instructional programs. The first component comes in the form of a process that involves some form of a corrective/feedback and enrichment process. Such a process requires the systematic administration of a formative assessment, like a quiz or writing activity. Should students fail to achieve mastery, the teacher provides detailed feedback coupled with supplementary activities to correct misunderstandings and learning errors. Daniels, Stupnisky, Pekrun, Haynes, Perry, and Newall (2009) found that students' emotions impact the true mastery of course material and individual achievement of performance-based goals. Students that are full of optimism thanks to previous positive experiences will perform better than those students who entered feeling uncertain and anxious. Sometimes the difference comes in the type of feedback that students receive from their teachers. Since a student's feelings are inherently involved in grading, one of the more difficult decisions comes in the amount of feedback to give a student (Brookhart, 2008). Brookhart concluded that students should be given enough feedback to illustrate what targets they have hit and show them which ones need to be improved in order to demonstrate mastery. Additionally, the impact of classroom assessments on mastery is heavily influenced by the perception of students toward the importance of tests and quizzes and their apparent value (Brookart, Walsh, & Zientarski, 2006). Partly for this reason, Willingham (2009) argues that mastery is more than rote memorization. This is critical as it may be argued that rote memorization can short-circuit student perception that the knowledge is valuable.

Post-assessment remastery comes in the form of additional readings, new instruction, or guided learning, and it jump starts a cyclical process that continues until the learner accomplishes mastery (Wormeli, 2006; O'Connor, 2007). Students that demonstrate mastery are given enrichment activities that challenge them by augmenting their understanding of the topic while those that are struggling complete their remastery. When mastery is achieved by every student, the class moves on to new material (Block & Burns, 1976; Bloom, 1981). When Mastery Learning is implemented properly and remains consistent across units, research shows that the amount of time needed for remastery decreases over the course of the school year (Anderson, 1994).

The second key component of Mastery Learning focuses on class consistency as it relates to the entire instructional and remastery process (Guskey, 1987). In other words, for Mastery Learning to work, teachers need to "stick to the script" and run remastery identically across every one of their units. Doing such helps acclimate students to the routines involved in a Mastery Learning environment. Granted, this means the teacher must spend a great deal of effort making sure that learning targets (or objectives, or guidelines, or benchmarks), instructional practices, feedback and remastery processes, and methods for assessing student mastery, are all aligned with one another (Anderson, 1994). Still, by using such a "road map," teachers can create for their students a trail from current levels of understanding to mastery (Wiggins & McTighe, 2005). Certainly, remastery (which is often referred to as "reassessment" throughout this paper) takes discipline on behalf of the students to go back and improve their understanding. In theory, if students do just that, they not only gain mastery of the concept, but their grades now reflect what they truly know (Wormeli, 2006). Research by Block and Burns (1976), Willent, Yamashita, and Anderson (1983), Guskey and Gates (1986), and Guskey and Pigott (1988)

verified that positive improvements in student learning result from the careful and systematic implementation of Mastery Learning. Kulik, Kulik, and Bangert-Downs (1990) put Mastery Learning to the test when they conducted a meta-analysis of studies including 108 classrooms that implemented such programs in elementary school, high school, and college. The researchers found that Mastery Learning had positive effects on not only the test scores of students but also on student attitudes toward course content and instruction.

One of the biggest weaknesses with Mastery Learning, however, is that it provides no direction regarding the initial delivery of the content material (Guskey, 1988; Slavin, 1989). Mastery Learning is back-loaded in its organization since it focuses on what happens *after* assessment. This is where Mastery Teaching thrives. According to Hunter (1982), Mastery Teaching is front-ended and impacts the initial instruction by providing teachers with a framework to outline the steps necessary for teaching an effective lesson. Despite an overabundance of Mastery Teaching approaches, Brandt (1985) found similarities among all of them that form the crux of its five key steps: (a) anticipatory set and statement of objectives; (b) instruction and modeling; (c) checking for understanding; (d) guided practice; and (e) independent practice. These five steps can work with any subject area, grade level, or student ability, making it a positive tool in student-centered educational practices (Hunter, 1985). The use of such a wide array of strategies by Mastery Teaching helps engage all students, including those behind academically, those with behavioral and emotional problems, English Language Learners (ELLs), and introverted students (Johnson, Uline, & Perez, 2014).

Whereas Mastery Learning produces considerable student assessment data, Mastery Teaching does not always include the tools needed for teachers to gather evidence to justify any positive effects on student learning, save from what could be deduced by casual observation

(Guskey, 1988) or through small-group conversations, electronic (or text-in) polling, white boards, and Socratic Seminars (Fisher & Frey, 2007). For this reason, studies appraising the use of Mastery Teaching have not produced more positive results (Slavin & Karweit, 1984; Stallings & Krasavage, 1986).

Guskey (1988) found that both Mastery Learning and Mastery Teaching, if used together, can actually be quite complementary. To a Mastery Learning program, Mastery Teaching adds the instructional component that gives teachers guidance into how to initially present lessons. Likewise, Mastery Learning can add to Mastery Teaching the organizational strategies that help teachers synthesize student progress as well as create meaningful units tied to learning targets. Guskey (1988), Walberg (1990), and Johnson, Uline, and Perez (2014) argue that the two approaches *together* collectively strengthen education by making teachers better at content delivery while simultaneously developing students as learners because of their environment and reassessment opportunities.

Differentiation and Differentiated Reassessment

Mastery Learning is an approach to education that requires careful attention on the part of the teacher to organize remastery. Students may not be able to independently reread to gain additional understanding of the content. As such, additional approaches to support remastery are vital. A near-universally accepted approach is differentiation, which has teachers craft their lessons and assessments around their students' needs and abilities rather than force students to mold themselves to fit the curriculum (Armstrong, 2008; DuFour, DuFour, Eaker, & Karhanek, 2004, 2009; Farrington & Small, 2008; O'Connor, 2002, 2007; Tomlinson, 1999, 2000a, 2000b, 2003, 2008; Wormeli, 2006). Essentially, "who" they teach shapes "how" they teach

(Tomlinson, 2008). Tomlinson (2000a & 2008) showed how differentiation within a standards-based classroom sees the teacher assign grades explicitly linked to each curriculum standard as the class moves through the units. Tomlinson (2000b) contended that in differentiated instruction, standards function as the ingredients for a dinner that are scattered all around the kitchen – but they are not the meal itself. The meal, she explained, is made by the teachers that know the ingredients and know the academic (dietary) needs of their students. Informed by the students' interests (tastes) and needs, the teachers then serve the meal in a manner that the students eat both wisely and, fingers-crossed, enthusiastically.

Aside from content delivery, differentiation can also be used when it comes to remastery and reassessment (Chapman & King, 2005). Following the first round of assessment and the distribution of feedback, students have a litany of options in which to demonstrate their refurbished understanding of the material. This can include completing an essay, holding an informal discussion with the teacher (oral reassessment), a project, or other forms of performance-based assessment (Tung, 2010). Differentiated reassessment, like Mastery Learning, provides teachers with the ideal quantitative and qualitative reflection of what a student has mastered (Cummins & Davesne, 2009).

Ahmed and Pollitt (2010) advocated the use of computers to assess and reassess students. Using computers to complete various tasks allowed teachers to gather enormous amounts of information about each student as well as measure how much assistance certain students required. The authors argue that computer software offers a unique form of differentiation that requires little extra preparation by the teacher and yields tremendous results. Some students were able to move ahead in their lessons while others were given supplementary time. Through the use of hints, prompts, clues, reassessment, and enrichment activities, all students achieved mastery.

Koong and Wu (2010) confirmed the positive impact that computer-aided testing can have in evaluating what topics students have mastered. Underachieving students did better on interactive multimedia tests than on standard paper-and-pencil examinations. Similarly, using performance-based assessments like essays, experiments, group projects, demonstrations, and portfolios for remastery activities allows students to take an active role in their education (Linn, Baker, & Dunbar, 1991; Herman, Aschbacher, & Winters, 1992; and Wiggins, 1993).

Standards-Based Curricula

Until the 1990s, public schools in the United States lacked clear standards of what high school graduates should know and be able to do (Hamilton, Stecher, & Yuan, 2008). Expectations varied from school-to-school, from district-to-district, and from state-to-state. This all changed when standards-based reform required all students to master challenging subject material and provided for a way to measure progress. According to Budge (2010), because its impact is felt in rural, suburban, and urban school districts alike, standards-based curricula continue to be at the forefront of debates revolving around mastery and No Child Left Behind (NCLB), the infamous legislative leviathan that was replaced in 2015.

Initially, in response to NCLB, all 50 states and Washington, D.C. established Academic Content Standards containing information that all students (grades K-12) should master (Ainsworth, 2003). In Ohio, Academic Content Standards are made up of benchmarks, which are grouped by grade-level clusters or bands (K-2, 3-5, 6-8, 9-10, and 11-12). These benchmarks are key checkpoints that monitor progress made toward standards and break the standard into what students should know and be able to do at a specific time in their schooling (ODE, 2008). The benchmarks are further divided into Grade Level Indicators (GLIs), which contain the knowledge and skills that all students should be able to master at each grade level. They serve as

checkpoints to monitor progress toward the benchmarks. When grouped with benchmarks and Academic Content Standards, GLIs form the backbone of the material taught in any given core subject (ODE, 2008). After 2010, Ohio replaced GLIs with strands and themes as the essential building blocks. Topics replaced benchmarks and represent the areas of learning within a strand (which may span multiple grade levels). While the strands, themes, and topics are not the same as the indicators and benchmarks, they still provide a road map through the curriculum.

Since these Ohio standards were punctiliously aligned with state accountability assessments, they came equipped to provide consistent sets of expectations for students and educators that are rigorous and inclusive (Beck, 2009; Kulm, Dager Wilson, & Kitchen, 2005; Roach & Elliott, 2009). Consequently, curriculum alignment – or more specifically, vertical and horizontal alignment – helps ensure that what is taught and assessed in classrooms is in step with state standards. Vertical alignment puts material in a coherent progression from one grade level or course to the next. Horizontal alignment establishes the connection between standards and assessments in each subject at a particular grade level. Together, vertical and horizontal alignment is designed to be implemented in all Ohio grades levels, from K-12 (Brown, 2010; Case & Zucker, 2005; Kagan, Carroll, Comer, & Scott-Little, 2006; Martineau, Paek, Keene, & Hirsch, 2007).

Standards-Based Grading

Standards-Based Grading (or SBG) directly utilizes standards, benchmarks, and GLIs (which are now "strands" and "themes") as a checklist for the material students need to master before they leave the classroom. The teacher assigns grades specifically to each strand or theme in every unit. For instance, a theme states that by the end of their freshmen year, all students

should be able to *"Explain connections among Enlightenment ideas, the American Revolution, the French Revolution, and Latin American wars for independence."* Therefore, when students complete the 9th grade, they should be able to show how the ideas of Enlightenment thinkers Thomas Hobbes, John Locke, Jean Jacques Rousseau, and Charles de Montesquieu impacted all three revolutions. Since the manner in which this material is taught is moot (although supporters of Mastery Teaching and differentiation will beg to differ), students are presented with the information. They are then assessed in a way that allows them to demonstrate what they know, be it by way of some performance-based assessment or in the form of a traditional multiple choice test. The feedback component of a classroom that uses Standards-Based Grading is where this system differs from the traditional "you failed the test" approach (and also why it falls in the category as a Mastery Learning program). In a SBG classroom, rubrics often replace the customary letter grade and provide students with scores on a four-point scale, including: Level 4 ("Mastery Achievement"), Level 3 ("Proficient Achievement"), Level 2 ("Basic Achievement"), and Level 1 ("Insufficient Achievement"). Level 3 and Level 4 means the student has demonstrated "mastery" for that particular standard/strand/theme, whereas Level 2 and Level 1 shows that the student did not. In such a program, students are given additional time to demonstrate mastery following an assessment in which they do not earn Level 3 or Level 4 for every unit standard covered. For example, a student that completes an in-class essay on the Age of Enlightenment and earns a Level 2 will be given another opportunity to show mastery of that particular standard.

Scriffiny (2008), who switched her routine high school math class's grading system to SBG, offered numerous reason why teachers should abandon the points-based system, including (a) grades have more meaning with SBG; (b) SBG forces teachers to rethink the value they give

to homework; (c) such a grading system allows teachers to adjust their instruction based upon what standards are being met and what ones are not; and (d) students better understand how to gauge quality (pp. 70-74).

In my classroom, I use SBG with differentiated reassessment, which means the feedback students receive following their initial assessment is tied directly to the state standards. A student's reassessment can come in the form of explaining the key points of the essay in a short-answer response, completing a project, discussing the topic with me in a one-on-one conference, or by way of any number of approved methods. When students demonstrate that they have mastered the state standard – even at a later date than their peers – their score is changed to reflect their new mastery. In preparing for their next round of assessment, students revisit their previous tests and identify problematic questions. Time is provided for the class to discuss and share studying strategies in the hope that this sort of reflection becomes second nature for the students as they move forward. Helping them embark on this journey of self-reflection is a crucial component of the classroom that employs differentiated reassessment. From my own experience in using a standards-based curriculum and differentiated reassessment, the two biggest outcomes have been metacognitive growth and improved motivation to continue strategic reflection after assessments.

Metacognition

Mastery Learning and Mastery Teaching, coupled with differentiation and SBG, help create an educational environment that is student-centered. However, does such a curriculum and instructional approach impact students' metacognitive ability to self-reflect on their own learning? Metacognition, the ability to properly evaluate one's own learning and thought process,

is usually not a strength for most high school students, especially when it comes to evaluating how well they learned, or what they mastered, beyond the grade on their test paper (Weimer, 2013). Metacognition is two-fold and includes mindfulness of one's thinking and learning as well as a critical awareness of oneself as a thinker and learner (Chick, Karris, & Kernahan, 2009; Hatano & Inagaki, 1986). Metacognitive practices help students identify and become cognizant of their strengths and weaknesses in academic settings. Students that know their strengths and weaknesses as writers, readers, test-takers and overall learners are more likely to "actively monitor their learning strategies and resources and assess their readiness for particular tasks and performances" (Bransford, Brown, & Cocking, 2000, p. 67). Theorists hope that as students learn about effective problem-solving strategies and the cognitive and motivational characteristics of thinking, accountability for monitoring learning shifts from the teachers to the students (Paris & Winograd, 1990).

In promoting the "metacognitive learner," teachers should note the difference between "learning" and "performance," especially since performance during training (or when students are first introduced to new material) is not an effective measure for post-training performance (Bjork, 1994). During any given new unit, the speed or accuracy in recalling the knowledge of the unit is "performance." What cannot be observed during this time, and what is typically not seen until the end of the unit assessment, are the changes in understanding, comprehension, and competence that support long-term retention – or "learning." Since learning can occur even if there appears to be no change in performance, and because changes in performance do not necessarily translate to actual learning, understanding how students learn, and how they reflect on their perceived learning, is critical to developing metacognition (Bjork, 1994; Dewey, 1933; Tanner, 2012).

Pintrich (2002) and Tanner (2012) found that in order for students to develop their skills in metacognition, they need to be taught the concept – but not in a reading or lecture-styled activity. Students learn "how to learn" by being able to identify, evaluate, and link new skills with old ones (Gall, Gall, Jacobsen, & Bullock, 1990; Zohar & David, 2009). The idea of the "testing effect," discussed at length by Roediger and Karpicke (2006), showed that when students are repeatedly assessed, their long-term retention of the material improves due to the act of retrieving information from memory during a testing situation. However, because students lack metacognitive attentiveness to the "mnemonic" benefits of testing, they experience the "illusions of competence" while studying, and these illusions directly impact which strategies students perceive as effective when they monitor their own learning (Bjork, 1994; Karpicke, Butler, & Roediger, 2009). Pintrich (2002) found that giving students opportunities after assessments to discuss what worked for them concerning test preparation, allowing them time to compare strategies, and providing additional opportunities to demonstrate their understanding of the content material all help lift the veil to individual students as to why they sometimes "get it" (and learn) while at other times they struggle (and do not learn).

Tanner (2012) discussed four popular strategies for student self-reflection, which included the use of pre-assessments, identifying confusions, retrospective post-assessments, and reflective journals. Understanding what their students already know about a topic before starting a unit promotes metacognition among students. Asking, "What do I already know about this topic that could guide my learning?" is a simple self-question that helps them begin planning how they could approach learning a new idea (Coutinho, 2007; Ertmer, 1996; Schraw, 1998). Angelo and Cross (1993) provide an example of helping students identify their confusions with the "Muddiest Point," a simple activity that takes only a few minutes at the end of class. Here,

students answer the self-question, “What was most confusing to me about the material being explored in class today?” The use of such reflection indicates to students that confusion is part of the learning process, and expressing this helps not only the teacher, but also the student. Similar to Bjork’s findings about “learning” and “performance,” Posner, Strike, Hewson, and Gertzog (1982) found that learning is a student-centered activity that sees them (ideally) change their ideas about a concept, topic, or general question. This means learning cannot occur if students fail to undergo a metacognitive “realization” about how they thought about the concept both before and after learning took place (Tanner, 2012). This can come in the form of retrospective post-assessments, which fosters students into experiencing an “Ah-ha!” moment.

Similar to pre-assessments and identifying confusions, post-assessments can be quick conversations or writings that could include completing the phrase: “Before this course, I thought evolution was… Now I think evolution is…” (Tanner, 2012). Lastly, reflective journals allow students the opportunity to openly admit, confess, or address perceived shortcomings (or successes) in the wake of a particular assignment or assessment. Teachers can extend this activity by having students reread their own journal entries before the next assessment as a way to either avoid making the same mistakes or to continue to employ a successful strategy that had worked the last time. Having students share these entries with other students as a way to create a community approach to learning also boosts metacognition by seeing that every student is a “learner-in-training” (Tanner, 2012).

There is clear evidence of a positive impact of metacognition on learning. Tomlinson and McTighe (2006) assert that the most successful students are metacognitive. This means they realize how they learn, are able to set learning goals, self-assess their own abilities and where they are at in a unit, and use creative strategies to better their understanding. A two-year

longitudinal study on metacognition by Van der Stel and Veenman (2010) had students complete text-studying tasks in history and problem-solving questions in math. The study discovered improvement in the metacognition of those that participated and demonstrated that such metacognitive skills can aid student learning performance regardless of their academic ability.

Motivation

Bandura (1986), who developed the Social Cognitive Theory, defines motivation as "an internal state that arouses, directs, and sustains goal-oriented behavior" (Glynn, Brickman, Armstrong, Taasoobshirazi, 2011, p. 1160). As students transition from elementary school to middle school and again from middle school to high school, they often suffer decreases in self-esteem and intrinsic interest in academics (Eccles, Wigfield, Flanagan, Miller, Reuman, & Yee, 1989; Eccles, Simpkins, S, & Davis-Kean, P., 2006). Bandura (1997) and Pajares (1996) found that this can lead to poor self-efficacy, meaning students no longer believe they can learn about a specific topic, learn in a certain class, or learn altogether. This obviously damages motivation and can result in them not paying attention in class, not preparing for tests, or not going to school (Cleary & Zimmerman, 2004).

The structure of school may foster motivational decline. Eccles et al. (1989) reasoned that motivational declines resulted from a "poor fit" between the students' psychological needs and their school environment. Pintrich and Schunk (2002) and Feldlaufer, Midgley, and Eccles (1988) found that despite the fact that adolescents are more than capable of functioning independently, they are often denied such autonomy in school. Ironically, they are expected by their teachers to exhibit such characteristics outside the classroom, which proves to be very difficult since they lack the practice or in-school opportunities to gain the metacognitive

strategies necessary to be successful (Zimmerman, 2002). Students that are unable to make proper and correct decisions concerning their study, decision, and regulatory strategies are often the ones that end up struggling in school (Dembo & Eaton, 2000; Weinstein, Husman, & Dierking, 2000; Zimmerman, 2002).

Conversely, students trained in metacognitive reflection display high levels of motivation and achievement (Schunk, 1996; Wood, Bandura, & Bailey, 1990). Clifford (1986) and Zimmerman (2002) found that metacognitively-motivated students are able to evaluate their performance on an assessment as it pertains to self-standards (e.g., past test scores), associate poor scores with faulty strategies (e.g., their strategic plan), and will make the obligatory adjustments before the next test (e.g., study over the course of a week rather than the night before a test). Being metacognitively aware of a course of action such as this is important because it allows students to maintain their motivation despite academic setbacks and during times of frustration (Clifford, 1986).

Letting educators use their personal strengths and interests to tailor their classrooms and approach to teaching helps makes the material more meaningful to students (Rabb, 2007). This, in turn, generates more motivation for students to learn, which leads to students taking more ownership of their education. Jarvela, Volet, and Jarvenoja (2010) and Vansteenkiste, Sierens, Soenens, Luyckx, and Lens (2009) noted a unidirectional correlation between motivation and social behavior. Students who are clustered according to the results of a “person-centered” approach for identifying motivational profiles had higher scores than those in more generic groups (Vansteenkiste, et al., 2009). Not surprisingly, Osterman (2000) found that teachers who establish supportive and welcoming atmospheres in their classrooms are able to nurture a sense of belonging, which increases student motivation and academic achievement. Walker and Greene

(2009) corroborated Osterman's (2000) findings in their study that used 249 high school students to examine perceptions of classroom achievement goals, self-efficacy, and a sense of belonging. They found that when students feel they are an important and noteworthy member of the "classroom community," they are more likely to develop personal achievements goals (as they pertain to mastery).

Conclusion

Helping students reflect on their learning is the foundation of self-efficacy and metacognition. Mastery Learning and Mastery Teaching, when used with differentiation and SBG, can create a student-centered environment capable of supporting metacognitive growth and sustained motivation. This being said, I conducted a reassessment study through Walden University in 2010 that compared the results on the American Government Start of Course Assessment (SOCA) and End of Course Assessment (EOCA) of two American Government classes. As the theoretical framework of the pilot study, differentiation (and its mode of implementation: the standards-based classroom) failed to produce student scores on the American Government EOCA that were significantly different from EOCA scores of similar students taught in a traditional classroom environment (Hartnell, 2011). The results of my study supported those of Slavin and Karweit (1984), who conducted a year-long study of the Mastery Learning program in Philadelphia. The two found no differences between Mastery Learning and a control group in mathematics. Rosales (2013) also compared SOCA and EOCA results for two sets of Algebra 2 classes where the participating teachers used SBG for one class and traditional grading practices for the other. In that study, no significant differences were found between the SBG and non-SBG students on the EOCA. Still, both the 2013 Rosales study and my 2011 Walden study concluded that the real benefit of a SBG classroom might be the ability to develop

a better system of communication between the school and the classroom as well as positively impact student accountability and their acuities of learning. Slavin (1989), however, collected other studies on Mastery Learning, eventually declaring, “The uncontested finding that yearlong studies show no greater effects for Mastery Learning than traditional methods on standardized measures should be the end of the story” (p. 78).

In 2012, I completed a follow-up study to my original Walden research at Otterbein University. Examining population subgroups and reassessment, I found that reassessment – while effective in raising semester grades of both ELL and non-ELL students – did not improve scores on the EOCA any more than they had in 2009 and did not impact the ELL subgroup any more than it did the mainstream students. As such, as part of my Capstone Project at Otterbein, I hoped to determine whether the use of differentiated reassessment had a metacognitive and motivational effect on how students perceive their learning when compared to the metacognition produced by more traditional classrooms.

SECTION THREE

Methodology

Setting and Participants

I conducted this quasi-experimental study with between-group comparative design at my place of employment, a suburban high school in Central Ohio. The school is one of three high schools, four middle schools, 14 elementary schools, and one Early Learning Center that inhabit a district that sprawls across 50 square miles and encompasses over 14,800 students. My school contains four grade levels (ninth, tenth, eleventh, and twelfth) and serves nearly 1,500 students. The course American History is a requirement for all ninth graders and is broken into two semesters that must be taken chronologically as American History 1 (Reconstruction through the Great Depression) and American History 2 (World War II to the present). Additionally, the course can be taken in an accelerated honors format (Honors American History 1 and Honors American History 2). For the purpose of this study, which was conducted during the first semester of the 2015-2016 school year, any student enrolled to take either American History 1 or Honors American History 1 as a ninth grader was eligible to participate (N = 327). Through the standard enrollment process, these students were divided among the three teachers that teach American History, which includes Mr. E, Mr. O, and myself. Union contract stipulates that no section (honors or otherwise) is permitted to have more than 30 students. Students that requested to be in Honors American History 1 were scheduled in one of the three sections taught by Mr. E or one of the two that I teach. Mr. O does not teach any sections of Honors American History 1.

Protection of Participants and Role of the Researcher

Risks to the student and teacher participants associated with my study were minimal and no greater than those faced on a daily basis. A *Parent/Guardian's Consent for Child and Student*

Assent form (Appendix A) and a *Letter of Cooperation* (Appendix B) from the school's principal approving the use of the school and its students for this study were collected. The Letter of Cooperation with the principal was transitioned into a *Data Use Agreement* (Appendix C) in order to provide me with access to a Limited Data Set (LDS) for use in this study in accordance with HIPAA and FERPA regulations. Concerning the data, and per the Data Use Agreement, no direct identifiers (such as names) were included in the LDS outside their initial role in pairing up Start of Course Assessment (SOCA) and End of Course Assessment (EOCA) scores to ensure that only the scores of the students that took both assessments were included in the study. The data released to me for this study was no different than the data reported to the school's administration and the district's curriculum coordinator. However, individual scores were not permitted for release; only SOCA and EOCA data categorized by period, level (honors or non-honors), and teacher were permissible for this study. In addition, I acknowledged and agreed not to disclose or discuss, divulge, copy, release, sell, or make unauthorized transmittals of confidential information. I acknowledged the legal implications of violating any and all terms. All data will be maintained in a locked file cabinet in the school for a period of three years following the completion of the study.

Hypotheses

Three null hypotheses and three alternative hypotheses were statistically analyzed. In the context of an experiment, a null hypothesis (H_{01}) predicts that the independent variable (the treatment) has *no effect* on the dependent variable (the population). The alternative hypothesis (H_{a1}) is the opposite of the null hypothesis and predicts that the treatment *does* have an effect on the population (Gravetter & Wallnau, 2008, p. 192).

The research questions that I investigated in this study were:

1. Does being taught in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum have a *metacognitive* effect on how 9th grade students perceive their learning?

H_{01} = There is no statistically significant difference in the metacognitive effect of how 9th grade students perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

H_{a1} = There is a statistically significant difference in the metacognitive effect of how 9th grade students perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

2. Does being taught in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum have a *motivational* effect on how 9th grade students perceive their learning?

H_{02} = There is no statistically significant difference in the motivational effect of how 9th grade students perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

H_{a2} = There is a statistically significant difference in the motivational effect of how 9th grade students perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

3. Does Mastery Teaching have an impact on the mastery of the material by 9th grade students when compared to students assessed in more traditional classrooms that do not offer reassessment?

H_{03} = There is no statistically significant difference in the improvement between SOCA and EOCA scores of students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

H_{a3} = There is a statistically significant difference in the improvement between SOCA and EOCA scores of students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

Treatment

The treatment came in the form of Mastery Learning (differentiated reassessment) and Mastery Teaching (Standards-Based Grading, or SBG), both of which are used in my American History 1 and Honors American History 1 courses. I adopted these approaches at the start of the 2008-2009 school year in the hopes of overhauling my grading practices and as a way to provide grades that better reflect the mastery of content material. To do so, I used state Grade Level Indicators (or GLIs) to assess mastery and provided struggling students with differentiated reassessment opportunities. It was my goal that in switching to such a classroom, I could boost motivation among students and get them to *want* to do better in history, to *believe* they could do better, and to *actually* do better. In theory, if I could get my students to become more motivated and metacognitively aware of their abilities, then their retention (and mastery) of state-mandated material would be demonstrated by significant gains between the SOCA and EOCA. As discussed in Section Two, differentiation refers to modifying instruction to meet the needs of all

learners (Northey, 2005; Tomlinson, 2008; Tomlinson & McTighe, 2006). This theory suggests that highly effective teaching means doing what is fair for students, including making grading practices conducive to maximizing the students' learning while truly reflecting what a student has (or has not) mastered. My SBG classroom serves as the vehicle for delivering this differentiated reassessment. After the initial assessment, my students have an abundance of options by which to correct their mistakes and demonstrate a new understanding of the material. These include essays, informal discussions (oral reassessment), projects, or other forms of performance-based assessment. Differentiated reassessment, like Mastery Learning, provides teachers with the ideal quantitative and qualitative reflection of what a student has mastered (Cummins & Davesne, 2009). As part of its functionality, a SBG classroom allows for reassessment throughout the semester to bring up a student's mastery and retention of course material.

Therefore, the treatment in my study was the use of differentiated reassessment in my five sections of American History 1. If Mastery Teaching (in the form of a SBG classroom) is truly able to produce students who master the material better than their peers, then my students should show greater growth between the SOCA and EOCA than the students in the non-SBG classrooms. If Mastery Learning (in the form of differentiated reassessment) actually has a metacognitive and motivational effect on how 9th graders perceive their own learning, then students in my classroom should score higher on the nine factors (F1-F9, discussed later in this section) created by the two questionnaires than their counterparts in classrooms that do not use differentiated reassessment.

Instrumentation and Materials

Data came from district test scores and two anonymous questionnaires. The tests used were the district-created, district-approved, and district-mandated SOCA and EOCA for the American History 1 classes. The first survey, called *The American History Motivation Questionnaire*, was adapted from Shawn M. Glynn's (2006) *The Science Motivation Questionnaire II*, or SMQII. *The Personal Responsibility Orientation to Self-Direction in Learning Scale* (or PRO-SDLS), created by Susan Stockdale in 2003, was the second survey administered. These surveys were given consecutively at the conclusion of the American History 1 EOCA, which occurred during the district's Final Exam Week (December 16-18, 2015).

All American History 1 and Honors American History 1 students in Mr. O, Mr. E, and my classes took a common American History 1 SOCA (Appendix D) during the second week of school. This provided basic data to draw an average score to use in this research study. The test was identical for both honors and non-honors classes and consisted of 35 multiple choice questions each linked to a state standard. Similarly, both classes took a common American History 1 EOCA at the end of the semester during the eighteenth week. This test consisted of the same 35 multiple choice questions that appeared on the SOCA. As part of the EOCA, students were given two short answer questions, which were excluded from analysis. Students' individual scores from both classes were recorded to show whether individual and class-wide improvement was made between the SOCA and the EOCA.

The first of the two anonymous surveys, modified from *The Science Motivation Questionnaire* by Glynn (2006), asked students about their perceptions of learning as well as the role history may (or may not) play in their lives. Glynn's original questionnaire was created to

help college professors identify students that lack motivation at the start of their science courses. The survey was found to have good "content validity" and "criterion-related validity," meaning its questions accurately assess what the person is answering and is predictive of later behavior (Glynn et al., 2011). The 25 questions evaluated five motivation components: intrinsic motivation, self-determination, self-efficacy, career motivation, and grade motivation (Table 1).

Table 1

SMQII Definitions

1. **Intrinsic motivation** – *The inherent satisfaction in learning science for its own sake* (Eccles, Simpkins, & Davis-Kean, 2006 – as cited by Glynn et al., 2011, p. 1161).
2. **Self-determination** – *The control students believe they have over their learning of science* (Black & Deci, 2000 – as cited by Glynn et al., 2011, p. 1161).
3. **Self-efficacy** – *The students' belief that they can achieve well in science* (Lawson, Banks, & Logvin, 2007 – as cited by Glynn et al., 2011, p. 1161).
4. **Career motivation** – *Important long-term goals that are the primary reason for pursuing a college degree* (Humphreys & Davenport, 2005 – as cited by Glynn et al., 2011, p. 1162).
5. **Grade motivation** – *Important short-term goals that measure college success and are part of the entry criteria for many careers* (Lin, McKeachie, & Kim, 2003 – as cited by Glynn et al., 2011, p. 1162).

Answers were measured along a five-point scale ("never," "rarely," "sometimes," "usually," "always") to questions like *"The science I learn is relevant to my life."* Glynn's five motivation categories were used to code the data (F1-F5) gathered from my version of the SMQII. In my survey, the word "science" was replaced by "history," and the survey was renamed *The American History Motivation Questionnaire* (Appendix E). This was permitted via fair-use and contingent upon the proper citation of Glynn et al. (2011), per the University of Georgia's guidelines.

The Personal Responsibility Orientation to Self-Direction in Learning Scale (or PRO-SDLS), created by Stockdale (2003), was the second survey administered (Appendix E). This questionnaire contained 25 items designed to measure a college student's self-directedness in learning. This self-directedness examines whether students take the "primary responsibility or initiative in the learning experience" (Stockdale & Brockett, 2011, p. 162). Answers were measured along a five-point scale ("strongly disagree," "disagree," "sometimes," "agree," "strongly agree") to questions like *"I am confident in my ability to consistently motivate myself."* The survey's four variables (initiative, control, self-efficacy, and motivation; Table 2) were used to code data (F6-F9) gathered from my version of the PRO-SDLS. In my survey, the word "college" was substituted by "high school." The words "professor" and "instructor" were replaced by "teacher." The PRO-SDLS was used with author permission.

Table 2

PRO-SDLS Definitions

1. **Initiative** – *Where people take the primary responsibility in the learning experience* (Stockdale & Brockett, 2011, p. 162).

2. **Control** – *When individuals assume ownership for their thoughts and actions* (Brockett & Hiemstra, 1991, p. 26 – as cited by Stockdale & Brockett, 2011, p. 163).

3. **Self-efficacy** – *The beliefs in one's capacities to organize and execute the courses of action required to produce given attainments* (Bandura, 1997, p. 3 – as cited by Stockdale & Brockett, 2011, p. 166).

4. **Motivation** – *The desire or willingness to do something, as broken into four types: a. external – behavior prompted by external contingencies such as rewards; b. introjected – behavior prompted by internal pressures such as avoidance of guilt; c. identification – behavior prompted by identification with the value of the activity; d. intrinsic – behaviors prompted out of enjoyment and interest in the activity* (Reeve, Deci, & Ryan, 2004 – as cited by Stockdale & Brockett, 2011, p. 166).

Statistical Analyses

My study looked to determine if there was a connection between my classroom and higher metacognitive and motivational scores on the SMQII and PRO-SDLS surveys. I also hoped to find that EOCA scores were better for my classes when compared to Mr. E and Mr. O's classes. Principal Component Analysis (PCA) sought to confirm that my students' answers corresponded to the factor structures described by Glynn et al. and Stockdale and Brockett (discussed in detail in Section Four). Analyses run using the Statistical Program for the Social Sciences, version 23.0 (or SPSS 23), included PCA, two nonparametric tests (the Mann-Whitney U test and the Kruskal-Wallis H test), and two parametric tests (one-way ANOVA and independent samples *t* tests).

PCA takes a large set of variables and condenses them down into a smaller set of variables (the "principal components") that are strong enough to account for the discrepancy (or "variance") in the original data set (Lund & Lund, 2016). The Mann-Whitney U test is a nonparametric test used to find differences between two groups with a dependent variable along a continuous scale, producing data that is mathematically similar to an independent samples *t* test (Statistics Solutions, 2016). While the *t* test is preferred, my data turned out to be non-normally distributed, which resulted in the need to use Mann-Whitney for some tests. This test was run to see if improvement between the American History 1 SOCA and EOCA (measured using a continuous scale) differed based upon classroom.

The one-way analysis of variance (or ANOVA) and its nonparametric equivalent, the Kruskal-Wallis H test, are hypothesis-testing procedures used to compare two or more populations. It offers a tremendous advantage over *t* tests, which can only be used for two

populations (Gravetter & Wallnau, 2008). I examined two populations when I compared classrooms that use differentiated reassessment (my class) with classrooms that do not use differentiated reassessment (Mr. E and Mr. O's sections combined). I looked at three populations when I separated Mr. E and Mr. O's non-SBG classrooms and compared them individually against one another and against my classrooms. The outcome in all of these analyses was to test whether the treatments (Mastery Teaching and Mastery Learning) produced "statistically significant" changes in the populations. When something is "statistically significant," it means there is no more than a 0.05 chance that the difference between groups results from sampling error.

Data Collection

Data collection began after receiving permission by the Institutional Review Board (IRB) at Otterbein University. A quasi-experimental, between-group comparative design was implemented to allow for those in the SBG classroom and those in the traditional settings to be studied and compared. Intervention during this experiment came in the form of Mastery Teaching and Mastery Learning, with a heavy emphasis on differentiated reassessment.

In the end, 232 of 327 survey responses were gathered (71% participation rate), with 116 in my SBG classroom and 116 in non-SBG classrooms (80 from Mr. E; 36 from Mr. O). All 327 student SOCA and EOCA scores were reported to school's administration and the district's curriculum coordinator. Of the 327 students, 124 were in my SBG classroom and 203 were in the non-SBG classrooms (127 in Mr. E; 76 in Mr. O). Section Four provides a summary of the findings as well as all data analysis undertaken.

SECTION FOUR

Results

Introduction

The purpose of this quasi-experimental study with between-group comparative design was to see if there is a connection between my SBG classroom (which uses differentiated reassessment) and higher metacognitive and motivational scores on the SMQII and PRO-SDLS surveys and whether this translated into larger statistical gains between SOCA and EOCA scores. Using the district's American History 1 SOCA and EOCA, the SMQII survey, and the PRO-SDLS survey, I ran statistical tests in the form of Principal Component Analysis (PCA), the Mann-Whitney U test, the Kruskal-Wallis H test, one-way ANOVA, and independent samples *t* tests in order to analyze the results and answer the three research questions. Data collection consisted of gathering student responses to the two surveys and their SOCA/EOCA scores from 13 American History classes at a suburban high school in Central Ohio.

Data Tracking

To track the data and results of both the SOCA/EOCA and the SMQII/PRO-SDLS, as well as to maintain confidentiality, I relied on the American History teachers in the other eight classes (five for Mr. E; three for Mr. O). Following the administration of the American History 1 and Honors American History 1 SOCA and EOCA, the individual Scantron forms were collected by the classroom teachers and scored, using the answer keys provided by the district. Since the EOCA was acting as a Final Exam for their courses, both teachers recorded the scores of each student into their online grade book. Only the SOCA and EOCA scores of students that had taken both forms of the assessment were used in this study. Those students that transferred classes or left the district and who did not take the EOCA had their SOCA scores removed.

Those students who arrived in the classroom after the SOCA had been given still took the EOCA for the purposes of their Final Exam grade, but their scores were also removed.

Principal Component Analysis: Do the Factor Structures of the SMQII and PRO-SDLS Conform to Expectations?

I used SPSS to run PCA independently for the SMQII and the PRO-SDLS. The hope in running PCA is to take a larger set of variables and condense them down into a smaller set of variables (the "principal components") that are strong enough to account for the discrepancy (or "variance") in the original data set. This allows the user to "cluster" variables together and reduce redundancy (Lund & Lund, 2016). Larger sample sizes are needed in order for PCA to yield reliable results, with most statistical sources recommending no fewer than 150 cases. As my study contained 232 survey participants and 327 test scores, sample size was not an issue. Additionally, PCA was conducted to make sure the resulting factors from my data matched up with Glynn's five factors in SMQII and Stockdale's four factors in PRO-SDLS.

Both the SMQII and the PRO-SDLS contain 25 questions, and both use a five-point scale. Knowing this, I elected to use a scale of 1 through 5 to code student responses. The SMQII used "never" (coded as 1), "rarely" (coded as 2), "sometimes" (coded as 3), "usually" (coded as 4), and "always" (coded as "5"). The PRO-SDLS used "strongly disagree" (coded as 1), "disagree" (coded as 2), "sometimes" (coded as 3), "agree" (coded as 4), and "strongly agree" (coded as 5). While this data is ordinal, Lovelace and Brickman (2013) caution against assuming that such coded numbers accurately represent units that can be transformed into data to justify the use of parametric statistical procedures. They caution that conclusions made in research that measure students attitudes, while impactful in studying educational strategies, "are only as good

as the quality of the measures and the methods used to analyze the data collected" (p. 615). As a result, I needed to make sure that I produced support for the validity of my findings. Lovelace and Brickman further argue that individual questions must be treated as ordinal but become meaningful if the theoretically supported individual questions are broken into factors (composite scores for multiple questions). PCA would later show that my study's factor structure was valid, and because Glynn and Stockdale have theoretical support for their factors, I could justify the use of parametric statistics to draw conclusions from my students' responses.

Principal Component Analysis of SMQII and PRO-SDLS

Questionnaire data loaded into nine total factors. SMQII data loaded into five factors (F1-F5), while PRO-SDLS data loaded into four factors (F6-F9). These factors were: 1. *Intrinsic motivation* (F1); 2. *Career motivation* (F2); 3. *Self-determination* (F3); 4. *Self-efficacy* (F4); 5. *Grade motivation* (F5); 6. *Initiative* (F6); 7. *Control* (F7); 8. *Self-efficacy* (F8); and 9. *Motivation* (F9). Factors coded as F4 and F8 both included information pertaining to self-efficacy, but both were tied to different surveys (F4 with the SMQII; F8 with the PRO-SDLS). In terms of motivation, the SMQII divided this into three separate factors: intrinsic (F1), career (F2), and grade (F5). The PRO-SDLS did not distinguish different kinds of motivation and kept it within its own factor (F9).

The factor categories of the SMQII, along with the corresponding survey questions from my version (*American History Motivational Questionnaire* or AHMQ), can be found in Table 3.

Table 3

Principal Component Analysis: Factor loading of items from AHMQ

Factor 1 (F1). ***Intrinsic motivation***

Question 1. *The history I learn is relevant to my life.*

Question 3. *Learning history is interesting.*

Question 12. *Learning history makes my life more meaningful.*

Question 17. *I am curious about discoveries in history.*

Question 19. *I enjoy learning history.*

Factor 2 (F2). ***Career motivation***

Question 7. *Learning history will help me get a good job.*

Question 10. *Knowing history will give me a career advantage.*

Question 13. *Understanding history will benefit me in my career.*

Question 23. *My career will involve history.*

Question 25. *I will use history problem-solving skills in my career.*

Factor 3 (F3). ***Self-determination***

Question 5. *I put enough effort into learning history.*

Question 6. *I use strategies to learn history well.*

Question 11. *I spend a lot of time learning history.*

Question 16. *I prepare well for history tests.*

Question 22. *I study hard to learn history.*

Factor 4 (F4). ***Self-efficacy***

Question 9. *I am confident I will do well on history tests.*

Question 14. *I am confident I will do well on history assignments and projects.*

Question 15. *I believe I can master history knowledge and skills.*

Question 18. *I believe I can earn a grade of "A" in history.*

Question 21. *I am sure I can understand history.*

Factor 5 (F5). ***Grade motivation***

Question 2. *I like to do better than other students on history tests.*

Question 4. *Getting a good history grade is important to me.*

Question 8. *It is important that I get an "A" in history.*

Question 20. *I think about the grade I will get in history.*

Question 24. *Scoring high on history tests matters to me.*

Note. As cited in Glynn, Brickman, Armstrong, and Taaoobshirazi (2011, p. 1167).

The factor categories of the PRO-SDLS, along with the corresponding survey questions, can be found in Table 4:

Table 4

Principal Component Analysis: Factor loading of items from PRO-SDLS

Factor 6 (F6). *Initiative*	**Factor 7 (F7). *Control***
Question 2. *I frequently do extra work in a course just because I am interested.*	Question 4. *If I am not doing as well as I would like in a course, I always independently make the changes necessary for improvement.*
Question 9. *I would rather take the initiative to learn new things in a course rather than wait for the instructor to foster new learning.*	Question 5. *I always effectively take responsibility for my own learning.*
Question 10. *I often use materials I've found on my own to help me in a course.*	Question 6. *I often have a problem motivating myself to learn.*
Question 15. *Even after a course is over, I continue to spend time learning about the topic.*	Question 13. *I usually struggle in classes if the teacher allows me to set my own timetable for work completion.*
Question 17. *I often collect additional information about interesting topics even after the course has ended.*	Question 19. *I am very successful at prioritizing my learning goals.*
Question 25. *I always rely on the teacher to tell me what I need to do in the course to succeed.*	Question 23. *I always effectively organize my study time.*
Factor 8 (F8). *Self-efficacy***	**Factor 9 (F9). *Motivation***
Question 1. *I am confident in my ability to consistently motivate myself.*	Question 3. *I don't see any connection between the work I do for my courses and my personal goals and interests.*
Question 7. *I am very confident in my ability to independently prioritize my learning goals.*	Question 8. *I complete most of my high school activities because I WANT to, not because I HAVE to.*
Question 12. *I am very convinced I have the ability to take personal control of my learning.*	Question 11. *For most of my classes, I really don't know why I take personal control of my learning.*
Question 21. *I am really uncertain about my capacity to take primary responsibility for my learning.*	Question 14. *Most of the work I do in my courses is personally enjoyable or seems relevant to my reasons for attending high school.*
Question 22. *I am unsure about my ability to independently find needed outside materials for my courses.*	Question 16. *The primary reason I complete course requirements is to obtain the grade that is expected of me.*
Question 24. *I don't have much confidence in my ability to independently carry out my student plans.*	Question 18. *The main reason I do the course activities is to avoid feeling guilty or getting a bad grade.*
*** My survey data did not confirm Factor 8.*	Question 20. *Most of the activities I complete for my high school classes are NOT really personally useful or interesting.*

Note. As cited in Stockdale and Brockett (2011, p. 171).

However, before I could run PCA – and to guarantee that when I did I would be able to generate reliable results – I had to make sure that my variables were linearly related and that my data did not contain any outliers. Outliers can incorrectly skew the results, and SPSS Statistics recommends identifying outliers as scores greater than three standard deviations away from the mean (Lund & Lund, 2016; SPSS 23, 2016; Gravetter & Wallnau, 2008). My data and variables were linearly related and no outliers were found. In order to run PCA, my data had to also satisfy three tests: 1. The Kaiser-Meyer-Olkin (KMO) measure for the data sets within the SMQII and the PRO-SDLS surveys; 2. The KMO measure for each individual variable (25 variables for each survey); and 3. Bartlett's Test of Sphericity.

The KMO helps confirm whether or not a sample is sufficiently large to run a PCA on a data set by computing a value from 0 to 1, with the minimum requirement for sample size adequacy of 0.6. Values above 0.8 are considered "meritorious" on Kaiser's (1974) classification of measure values and indicate that a PCA will be useful. In my study, my version of the SMQII resulted in a KMO score of .900; my PRO-SDLS came in at .881. This suggests that my data sets for both surveys were sufficiently large for PCA. Table 5 and Table 6 display these results.

Table 5

KMO and Bartlett's Test for AHMQ

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.900
Bartlett's Test of Sphericity	Approx. Chi-Square	3441.681
	df	300
	Sig.	.000

Note. These tests were run using SPSS, version 23.

Table 6

KMO and Bartlett's Test for PRO-SDLS

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.881
Bartlett's Test of Sphericity	Approx. Chi-Square	2082.164
	df	300
	Sig.	.000

Note. These tests were run using SPSS, version 23.

Having met the KMO for my data sets, I then needed to look at the KMO value of my two surveys individual variables. With these scores, researchers would like for each of their variables to be as close to 1 as possible, with a minimum of 0.5. If an individual variable has a low KMO measure (KMO < 0.5), then it is recommended that researchers remove it from the analysis (Lund & Lund, 2016). In my study, all KMO measures came in greater than 0.7, meaning there was adequacy of sampling for the individual questions.

The final test to see if I was able to run PCA, called Bartlett's Test of Sphericity, checks to see if there are adequate correlations between variables. If there are adequate correlations between variables, it would mean my variables are capable of being reduced to a smaller number of components. (Lund & Lund, 2016). If Bartlett's Test of Sphericity was statistically significant ($p < .05$), then my data would be suitable for PCA. In referencing Table 5 on the previous page, this significance value (i.e., *p* value) is located in the "Sig." row. In both the SMQII and the PRO-SDLS, the Sig. shows ".000," which essentially means $p < .0005$. My data was found to be suitable for PCA.

The interpretability criterion for the Rotated Component Matrix shows how each component loads on each variable with an objective of achieving "simple structure." This means that each survey items loads strongly on only one factor, and each factor includes at least three survey items. In running these tests, my hope was that the 25 questions that I used from the SMQII and the 25 questions from the PRO-SDLS all load into the same pre-determined factors as loaded by Glynn (SMQII) and Stockdale (PRO-SDLS). Glynn's SMQII loaded Questions 1, 3, 12, 17, 19 into Factor 1 (*Intrinsic motivation*); Questions 7, 10, 13, 23, and 25 into Factor 2 (*Career motivation*); Questions 5, 6, 11, 16, and 22 into Factor 3 (*Self-determination*); Questions 9, 14, 15, 18, 21 into Factor 4 (*Self-efficacy*); and Questions 2, 4, 8, 20, and 24 into Factor 5 (*Grade motivation*). Stockdale's PRO-SDLS loaded Questions 2, 9, 10, 15, 17, and 25 into Factor 6 (*Initiative*); Questions 4, 5, 6, 13, 19, and 23 into Factor 7 (*Control*); Questions 1, 7, 12, 21, 22, and 24 into Factor 8 (*Self-efficacy*); and Questions 3, 8, 11, 14, 16, 18, and 20 into Factor 9 (*Motivation*).

The Rotated Component Matrix for the SMQII saw all of my questions for Factor 1 load in Factor 1, just like they did for Glynn. The same was true for Factors 2, 4, and 5. Question 11 ("*I spend a lot of time learning history"*) should have loaded for Factor 3 (*Self-determination*) but instead loaded for Factor 1 (*Intrinsic motivation*). This was the only question that did not match Glynn et al.'s results, so I used Glynn et al.'s structure. The Rotated Component Matrix for the PRO-SDLS saw Factors 6, 7, and 9 correctly load their corresponding questions. However, Factor 8 (*Self-efficacy*) had only three of its six questions land within the factor. Since Factor 8 from the PRO-SDLS was the same as Factor 4 of the SMQII, I elected to cut Factor 8 in favor of the results from Factor 4.

Are There Differences in Motivation and/or Metacognition in the Treatment and Non-Treatment Groups?

Motivation and Metacognition – All Students: SBG vs. Non-SBG

Having confirmed the SMQII and PRO-SDL factor structures, I was able to compare the coded student responses for Factors 1-5 (SMQII) and Factors 6-9 (PRO-SDLS) to see if there was a statistically significant difference between students in my classes (which utilizes SBG and differentiated reassessment) and those in Mr. E and Mr. O's classes (which do not utilize SBG and do not use differentiated reassessment). Since the independent samples *t* test is used when comparing two groups, I was unable to use that particular statistical test to examine three teachers. As such, I needed to use a one-way analysis of variance (ANOVA). However, according to Lund and Lund (2016), a one-way ANOVA is unable to tell a researcher which groups were statistically different – it can only show that at least two of them were different. With three groups in my study, determining which group is different is important, and follow-up post hoc tests were needed. Specifically, the Tukey post hoc provides statistical significance level (i.e., *p* value) for each comparison (Lund & Lund, 2016).

Using the Shapiro-Wilk Test for Normality, which confirms that a sample came from a normally distributed population (Lund & Lund, 2016), Factor 1 was found to be non-normal. This was confirmed because the skewness to standard error ratio for the data in Mr. E's class (also called the *z* score) was > 2.58. As a result, I did not worry about the two outliers present because this prompted me to use a nonparametric test. Factor 2 failed the Shapiro-Wilk Test, but I treated it as normal because all *z* scores were between –2.58 and 2.58. With Factor 3, only my students' scores failed the Shapiro-Wilk Test but passed the *z* score, which meant I could treat it

as normal. The single outlier proved not to be an issue. Factors 4 and 5 were non-normal, but because I used a nonparametric test, the outliers were not an issue. When Factor 6 came back as normal, it had four outliers. The outliers were in nearly symmetric pairs in both my class and Mr. E's class, so I elected to keep the outliers. To make sure these four outliers did not impact the results, I re-ran the analysis twice (with and without the outliers), which confirmed that they did not. Factor 7 failed the Shapiro-Wilk Test but passed the *z* score tests for skewness and kurtosis, so I treated it as normal and included the outlier. Factor 8 failed the Shapiro-Wilk Test but passed the *z* score; however, Factor 8 was the factor I elected to cut because of the PCA and the inability of the questions to properly load on the factor. (Factor 4 replaced this factor.) Lastly, Factor 9 was normal but had two outliers. I ran the tests with and without the outliers to prove that they did not affect my results. They did not.

For the non-normally distributed data, I switched to the nonparametric Mann-Whitney U test for comparisons of two levels and the Kruskal-Wallis H test for comparison of three or more levels. With the normality tests, the one-way ANOVA was only valid for Factors 2, 3, 6, 7, and 9. For the others, Factors 1, 4, and 5, I ran the Kruskal-Wallis H test. For Factors 2, 3, 6, 7, and 9, equality of variance was satisfied for all variables, so I used the ANOVA table rather than the Robust Test for Equality of Means table. From the ANOVA table of my normally distributed variables, only Factor 3 had $p < .05$. This allowed me to conclude that there were no significant differences among classrooms for Factors 2, 6, 7, and 9. For Factor 3, however, there were some differences between classrooms, but because ANOVA is not capable of determining what those are, I turned to post-hoc tests, most notably the Tukey post hoc test. This test provides the researcher a statistical significance level (*p* value) for each pairwise comparison (Lund & Lund, 2016). Here I found that Mr. O (mean F3 = 3.07) and Mr. E (mean F3 = 3.538) were

significantly different from one another (p = .133), and Mr. O (mean F3 = 3.071) and my class (mean F3 = 3.555) were significantly different from one another (p = .070). However, my class (mean F3 = 3.555) and Mr. E (mean F3 = 3.538) were not statistically different from one another. This did not support my hypothesis that my treatment causes a change, because if that were the case, then my class would have been significantly different from Mr. E's class. My class would also have been significantly different from Mr. O, while Mr. O and Mr. E would have been the same as one another. Not until I broke the classes into sub-groups and examined non-honors against non-honors and honors against honors did I find that Factor 5 (*Grade motivation*) was statistically significantly higher for my non-honors students (M = 4.384) than for the non-honors in Mr. E and Mr. O's non-SBG classrooms (M = 4.096), U = 1,318, p = .026. (This is discussed in greater detail in Section Five.)

As a result, I was unable to reject the first null hypothesis (H_{01}), meaning there is no statistically significant difference in the metacognitive effect of how 9th grade students (as a whole) perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms. I was also unable to reject the second null hypothesis (H_{02}), meaning there is no statistically significant difference in the motivational effect of how 9th grade students (as a whole) perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms. However, there is a statistically significant difference among non-honors students when it comes to *grade* motivation. Again, this is discussed at length in the next section.

Motivation and Metacognition – All Students: Non-Honors vs. Honors

Using all students that completed the SMQII and PRO-SDLS surveys (N = 232; 118 enrolled in non-honors classes and 114 enrolled in honors classes), the Shapiro-Wilk Test for Normality found Factors 3, 6, and 7 were normally distributed; Factors 1, 2, 4, 5, and 9 were not. A parametric independent samples t test indicated a statistically significant difference for Factor 3 (*Self-determination*) between honors (M = 3.660) and non-honors students (M = 3.295), t = -3.969, p = .0005. The test also found that for Factor 6 (*Initiative*), there were statistically significant differences between honors (M = 3.007) and non-honors students (M = 2.791); t = -2.918, p = .004). The tests found no statistically significant differences for Factor 7 (*Control*). The nonparametric Mann-Whitney U test, used for Factors 1, 2, 4, 5, and 9 found statistically significant differences between all honors and non-honors students for Factors 1, 4, and 5. Factor 1 (*Intrinsic motivation*) was statistically significantly higher for honors students (M = 3.546) than for the non-honors students (M = 3.102), U = 8,635, p = .0005. Factor 4 (*Self-efficacy*) was also statistically significantly higher for honors students (M = 4.067) than for the non-honors students (M = 3.647), U = 9,106, p = .0005. Lastly, Factor 5 (*Grade motivation*) was statistically significantly higher for honors students (M = 4.500) than for the non-honors students (M = 4.253), U = 8,653.50, p = .0005. The results can be seen in Table 7.

Table 7

Statistically Significant Factor Means for Honors vs. Non-Honors Students

Factor	Honors	Non-Honors	*p* values
Factor 1 (*Intrinsic motivation*)	M = 3.546	M = 3.102	*p* = .0005
Factor 3 (*Self-determination*)	M = 3.660	M = 3.295	*p* = .0005
Factor 4 (*Self-efficacy*)	M = 4.067	M = 3.647	*p* = .0005
Factor 5 (*Grade motivation*)	M = 4.500	M = 4.253	*p* = .0005
Factor 6 (*Initiative*)	M = 3.007	M = 2.791	*p* = .0040

Note 1. Factor 2 (*Career motivation*), Factor 7 (*Control*), and Factor 9 (*Motivation*) were not statistically significant. Factor 8 (*Self-efficacy*) was not used as my survey data did not confirm it.

Note 2. These tests were run using SPSS, version 23.

Motivation and Metacognition – Non-Honors Students: SBG vs. Non-SBG

Concerning the non-honors students that completed the SMQII and PRO-SDLS surveys (*N* = 118; 64 enrolled in my non-honors SBG classes and 54 in the non-honors non-SBG classes), the Shapiro-Wilk Test for Normality found Factors 1, 2, 3, 6 and 9 were normally distributed; Factors 4, 5, and 7 were not. My survey data did not confirm Factor 8 (*Self-efficacy*); as such, it was removed from analysis. (However, Factor 4, which also covered self-efficacy, was confirmed by my data, so it replaced Factor 8 in the analysis.) The parametric independent samples *t* test for Factors 1, 2, 3, 6, and 9 found that my SBG classroom does not affect non-honors students in a statistically significant way. The nonparametric Mann-Whitney U test, used for Factors 4, 5, and 7 because they were not normally distributed, was run to determine if there were differences in motivation and metacognition scores between non-honors students in SBG

and non-SBG classrooms. Only Factor 5 (*Grade motivation*) was statistically significantly higher for my non-honors students (M = 4.384) than for the non-honors in the non-SBG classrooms (M = 4.096), U = 1,318, p = .026.

Motivation and Metacognition – Honors Students: SBG vs. Non-SBG

Concerning the honors students that completed the SMQII and PRO-SDLS surveys (N = 114; 53 enrolled in my honors SBG classes and 61 in the honors non-SBG classes), the Shapiro-Wilk Test for Normality found Factors 1, 2, 3, 6, 7 and 9 were normally distributed; Factors 4 and 5 were not. The parametric independent samples t test for Factors 1, 2, 3, 6, 7 and 9 and the nonparametric Mann-Whitney U test for Factors 4 and 5 both found that my SBG classroom does not affect honors students in a statistically significant way.

Are There Differences in SOCA/EOCA in the Treatment and Non-Treatment Groups?

The data analysis for the third question examined the difference (comparison) between two populations (those in my SBG classes; those in Mr. E and Mr. O's non-SBG classes). Sub-groups of students from each class were also analyzed, specifically how Mr. E's honors students performed when compared to my honors students and how Mr. O's and Mr. E's non-honors students scored when paralleled to my non-honors students. Does Mastery Teaching have an impact on the mastery of the material by 9^{th} grade students?

As for the statistical tests, mean scores were computed and compared between the intervention and control groups using Hake Gains and independent samples t tests. Hake Gains look for "normalized gains" between pre- and post-test scores. Such a gain is the increase in each student's pre-test score divided by the average increase that would have resulted if each student had a perfect score on a post-test (Hake, 1998). Hake (1998) argues that the normalized gain is a

meaningful measure of how well an intervention works when comparing populations having different pre-test scores. In my study, this intervention is SBG and differentiated reassessment. Such tests provided the right kind of statistical information to either reject or fail to reject the third null hypothesis (H_{03}).

The third research question for this study examined the difference in the EOCA scores of non-honors, honors, and all students combined within the two classrooms (SBG and non-SBG). Table 8 contains the SOCA and EOCA results by class, as well as the Hake Gains.

Table 8

Combined Group Statistics and Hake Gains for Non-SBG vs. SBG Classrooms

Group	*N*	SOCA*	EOCA	Hake	*t*	*p*
Non-SBG All Students	8	25.80	53.90	63.57%	1.679	.121
SBG All Students	5	28.68	58.22	71.49%		
Non-SBG Non-Honors	5	24.83	51.08	58.11%	3.125	.020
SBG Non-Honors	3	28.47	57.67	70.31%		
Non-SBG Honors	3	27.41	58.60	73.20%	–.002	.999
SBG Honors	2	29.00	59.05	74.40%		

* Both SOCA and EOCA scores were out of 70 possible points.

SOCA and EOCA – All Students: SBG vs. Non-SBG

After calculating the Hake Gains for all student EOCA scores, an independent samples *t* test was run to compare the Hake Gains percentages for the SBG and non-SBG classrooms. EOCA scores for each classroom (SBG vs. non-SBG) were normally distributed, as assessed by the Shapiro-Wilk Test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's Test for Equality of Variances ($p = .042$). My SBG students did better on their EOCA ($M = 71.49\%$, $SD = .037$) than the students enrolled in the non-SBG classes ($M = 63.57\%$, $SD = .094$), a statistically significant difference, $M = .075$, 95% CI [-.02, .17], $t(11) = 1.679$, $p = .121$. The results for all student EOCA Hake Gain can be seen in Table 9.

Table 9

Independent Samples Test for All Students EOCA Hake Gain

	Levene's Test for Equality of Variances							95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower Bound	Upper Bound
Hake Gain	5.298	.042	1.679	11	.121	.0749538	.0446387	-.0232954	.1732029

Note. These tests were run using SPSS, version 23.

For all students, I was able to reject the third null hypothesis (H_{03}), meaning there is a statistically significant difference in the improvement between SOCA and EOCA scores of all students (combined) in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

SOCA and EOCA – Non-Honors Students: SBG vs. Non-SBG

After calculating the Hake Gains for non-honors student EOCA scores, an independent samples *t* test was run to compare the Hake Gains percentages for the non-honors classrooms. There were no outliers in the data, as assessed by inspection of a boxplot. EOCA scores for each non-honors classroom (SBG vs. non-SBG) were normally distributed, as assessed by the Shapiro-Wilk Test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's Test ($p = .769$). My SBG non-honors students gained more between the pre- and post-test (M = 70.31%, SD = .045) than the non-honors students enrolled in the non-SBG classes (M = 58.11%, SD = .056), a statistically significant difference, $M = 0.12$, 95% CI [0.03, 0.21], $t(6) = 3.125$, p = .020, $d = .05$. The results for non-honors Hake Gain can be seen in Table 10.

Table 10

Independent Samples Test for Non-Honors EOCA Hake Gain

	Levene's Test for Equality of Variances							95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower Bound	Upper Bound
Hake Gain	.095	.769	3.125	6	.020	.1187120	.0379873	.0257604	.2116635

Note. These tests were run using SPSS, version 23.

For non-honors students, I was able to reject the third null hypothesis (H_{03}), meaning there is a statistically significant difference in the improvement between SOCA and EOCA scores of non-honors students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and non-honors students in traditional classrooms.

SOCA and EOCA – Honors Students: SBG vs. Non-SBG

After calculating the Hake Gains for honors student EOCA scores, an independent samples *t* test was run to compare the Hake Gains percentages for the honors classrooms. There were no outliers in the data, as assessed by inspection of a boxplot. EOCA scores for each honors classroom (SBG vs. non-SBG) were normally distributed, as assessed by the Shapiro-Wilk Test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's Test ($p = .114$). My SBG honors students did not do statistically significantly better on their EOCA ($M = 74.4\%$, $SD = .015$) than the honors students enrolled in the non-SBG classes ($M = 73.2\%$, $SD = .061$), no statistically significant difference, $M = -.00008$, 95% CI [-0.15, 0.15], $t(3) = -.002$, $p = .999$. The results for honors EOCA Hake Gain can be seen in Table 11.

Table 11

Independent Samples Test for Honors EOCA Hake Gain

	Levene's Test for Equality of Variances							95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower Bound	Upper Bound
Hake Gain	4.907	.114	-.002	3	.999	-.0000814	.0460023	-.1464812	.1463184

Note. These tests were run using SPSS, version 23.

For honors students, I was unable to reject the third null hypothesis (H_{03}), meaning there is not a statistically significant difference in the improvement between SOCA and EOCA scores of honors students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and honors students in traditional classrooms.

Summary

I used 232 survey respondents to examine the first hypothesis (metacognition) and second hypothesis (motivation). One hundred and sixteen students were in my SBG classes while 116 were in the non-SBG classrooms (80 from Mr. E; 36 from Mr. O). This whole group comparison examined students in both honors and non-honors sections and cut across both SBG and non-SBG classes. I was unable to reject the first null hypothesis (H_{01}) and second null hypothesis (H_{02}), meaning there is no statistically significant difference in the metacognitive and motivational effect of how 9th grade students (as whole) perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms. However, there is a statistically significant difference among non-honors students when it comes to *grade* motivation.

All 327 student SOCA and EOCA scores were used to calculate averages for each American History 1 class's pre- and post-tests. Of the 327 students, 124 were in my SBG classroom and 203 were in the non-SBG classrooms (127 in Mr. E; 76 in Mr. O). Overall, my non-honors and honors students (combined) and my non-honors (individually) produced higher Hake Gains on their EOCA than the students in the non-SBG classes. I was able to reject the third null hypothesis (H_{03}), meaning there is a statistically significant difference in the improvement between SOCA and EOCA scores of students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

Section Five advances the interpretation of my study's findings in greater detail. In addition, that section provides recommendations for action and presents my final reflection.

SECTION FIVE

Discussion

Introduction

"Points? Your perception of what makes up a student's grade is disappointing."

In an instant, eight years of perceived "awesomeness" was swatted away like a horse fly.

In 2008, I was in my eighth year as an educator – and pretty confident that I knew what I was doing. I brought history to life through booming lectures and crazy uniforms. After all, nothing gets the attention of a 14-year-old student with ADD quite like having their 6'3" teacher wearing 75 pounds of chain mail mock fighting infidels across the desks during a lecture on the Crusades. I did not use the course text and instead wrote my own material intermixed with humor and "Did he say that?" flashes of wonder and amusement. I lived for the "Ah-ha!" moment when I could see a student "get it." My burly build, shaved head, shaggy beard, and tattoos gave me a head-start on discipline, although my push-up policy helped put a pep in the step of even the best hallway roamers. Indeed, at a quick glance, I was owning it.

Until that conference.

I consider the "What is in a grade?" question that I attempted to answer in front of 300 teachers during a conference on assessment and differentiation in downtown Columbus to be the turning point in my young career. I left understanding that, up until that moment, grades in my class simply showed that students were able to "play the school game." They knew how to work the points system. Grades in my class reflected whether or not students gathered enough points and were not true reflections of their mastery. I used grades and threats like, "If you do not get a 'C' on your final, you will not be eligible in the fall!" as extrinsic motivators. The problem is,

students have to be intrinsically motivated, meaning their desire to achieve and improve has to come from within themselves. Intrinsic motivation clearly conflicts with the use of grades as extrinsic motivators (O'Connor, 2007). As a result, I had to change what grades "meant" in my classroom, which ignited an overhaul of how students would be assessed.

For an entire summer, I wrestled with the question of "What does a grade truly reflect?" Is it what a student knows at the exact moment when they take a test? Or is it a representation of what they know from a variety of activities and assessments? Additionally, what role do grades play in truly assessing what a student does or does not know? I found myself asking what I saw as more important – that 70% of my 150 students know the material on November 7th, an arbitrary date picked by me as the day in which every student must prove their mastery of the American Revolution, or that 100% of my 150 students master the material at some point during the school year?

Can my students recall information they have been taught?

Can they apply what they know to future problems?

Will they remember it when they leave the classroom?

Do they memorize the material for the test – then forget it all?

These questions became my marching orders, and I turned to Mastery Teaching and Mastery Learning to direct my classroom's reinvention. By adopting Standards-Based Grading (Mastery Teaching) and the use of differentiated reassessment (Mastery Learning), I hoped I could boost motivation among students and get them to *want* to do better in history, to *believe* they could do better, and to *actually* do better. In theory, if I could get my students to become more motivated and metacognitively aware of their abilities, then their retention (and mastery) of

state-mandated material would be demonstrated by significant gains between district tests given at the start and end of each semester. This instructional inquiry project looked to determine just that, and, after running statistical tests using SPSS, I was able to conclude that a SBG classroom that uses differentiated reassessment ***does*** result in higher EOCA scores and more grade motivation among non-honors students. My classroom overhaul in 2008 was not in vain.

Specifically, I used 232 survey respondents to examine my first hypothesis (metacognition) and my second hypothesis (motivation). One hundred and sixteen students were in my SBG classes while 116 were in the non-SBG classrooms (80 from Mr. E; 36 from Mr. O). This whole group comparison examined students in both honors and non-honors sections and cut across both SBG and non-SBG classes. I was unable to reject the first null hypothesis (H_{01}), meaning there is no statistically significant difference in the metacognitive effect of how 9th grade students (as a whole) perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms. I was also unable to reject the second null hypothesis (H_{02}), meaning there is no statistically significant difference in the motivational effect of how 9th grade students (as a whole) perceive their learning in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms. However, there is a statistically significant difference among non-honors students when it comes to *grade* motivation (SMQII's Factor 5).

All 327 student SOCA and EOCA scores were used to calculate averages for each American History 1 class's pre- and post-tests. Of the 327 students, 124 were in my SBG classroom and 203 were in the non-SBG classrooms (127 in Mr. E; 76 in Mr. O). Overall, my non-honors and honors students (combined) and my non-honors (individually) produced higher

Hake Gains on their EOCA than the students in the non-SBG classes. I was able to reject the third null hypothesis (H_{03}), meaning there is a statistically significant difference in the improvement between SOCA and EOCA scores of students in a social studies classroom that utilizes differentiated reassessment within a standards-based curriculum and students in traditional classrooms.

SOCA/EOCA Hake Gains

The results of the Hake Gain calculations between SOCA and EOCA provided some reassuring validation to my SBG classroom. When all students were taken into account and not separated out into honors and non-honors, SBG students produced larger Hake Gains (71.49%) than the non-SBG students (63.57%). When the tests were broken into sub-categories, the difference between SBG honors students (74.4%) and non-SBG honors students (73.2%) was statistically non-existent, while the difference between SBG non-honors students (70.31%) and non-SBG non-honors students (58.11%) was quite staggering.

Research by Block and Burns (1976), Willent, Yamashita, and Anderson (1983), Guskey and Gates (1986), and Guskey and Pigott (1988) verified that positive improvements in student learning result from the careful and systematic implementation of Mastery Learning (like my differentiated reassessment). Kulik, Kulik, and Bangert-Downs (1990) found that Mastery Learning had positive effects on not only the test scores of students, but also on student attitudes toward course content and instruction. The larger Hake Gains for the non-honors population appears to corroborate Bloom's (1968) argument that all students are fully capable of learning if placed in an environment that requires them to attain "mastery" before moving forward in their course material. A classroom that emphasizes learning over grades helps students validate their

education (DeKeyrel, Dernovish, Epperly, & McKay, 2000). Is it this validation – this idea that school is more than "points" – that produced such Hake Gains for my non-honors students? Does my SBG classroom and differentiated reassessment reveal to non-honors students the possibility that they can, in fact, "do" school – a thought that may not manifest in a traditional classroom? Does this newfound confidence give non-honors students the same perception that honors students already have? If honors students do not need validation as to the importance of school – and they enter the classroom knowing they can handle whatever expectations the teacher sets for them – is this why my honors students did not have larger Hake Gains than the non-SBG honors students? I suspect that my honors students did not need to be reminded of the importance of reassessment like my non-honors students, which is why offering such extended opportunities of mastery did not have as large of an impact on them. Since honors students are generally predispositioned to be "point hounds," did they see reassessment as a way to improve their grade instead of as a way to master the material? In other words, is the entire concept of remastery and reassessment lost on them entirely? I would argue this helps explains why SBG and differentiated reassessment is more effective on non-honors students than on honors students.

The Curious Case of Factor 5

Of all the survey factors that came back statistically significant, it was Factor 5 (*Grade motivation*) that remained the most curious. The 64 non-honors students in my SBG classroom that completed the SMQII scored significantly higher in grade motivation than the other 54 non-honors students in the non-SBG classrooms. In dissecting Factor 5, we find that grade motivation is defined as "important short-term goals that measure [high school] success and are part of the entry criteria for many careers" (Lin, McKeachie, & Kim, 2003 – as cited by Glynn et al., 2011,

p. 1162). The score for this came from Questions 2, 4, 8, 20, and 24 (see Table 12), all of which successfully loaded when I ran PCA.

Table 12

AHMQ's Factor 5

Grade motivation
Question 2. *I like to do better than other students on history tests.*
Question 4. *Getting a good history grade is important to me.*
Question 8. *It is important that I get an "A" in history.*
Question 20. *I think about the grade I will get in history.*
Question 24. *Scoring high on history tests matters to me.*

Note. As cited in Glynn, Brickman, Armstrong, and Taaoobshirazi (2011, p. 1167).

While it is fairly common knowledge that honors students are motivated by good grades – despite efforts by teachers nationwide to stress "learning" over "points" – is it possible that my SBG classroom turns non-honors students into the very thing we try to change our honors students out of being? That is, are they missing the point of education by becoming overly absorbed by points rather than mastery?

However, the feedback component of a classroom that uses SBG is where this system differs from the traditional "you failed the test" approach (and also why it falls in the category of Mastery Learning). In a SBG classroom, rubrics often replace the customary letter grade and provide students with scores on a four-point scale, including: Level 4 ("Mastery Achievement"), Level 3 ("Proficient Achievement"), Level 2 ("Basic Achievement"), and Level 1 ("Insufficient Achievement"). Level 3 and Level 4 means the student has demonstrated "mastery" for that particular standard/strand/theme, whereas Level 2 and Level 1 shows that the student did not. In

my SBG classes, students are given additional time (generally two weeks) to demonstrate mastery following an assessment in which they do not earn Level 3 or Level 4 for every unit standard covered. A student's reassessment can come in the form of explaining the key points of the essay in a short-answer response, completing a project, discussing the topic with me in a one-on-one conference, or by way of any number of approved methods. When students demonstrate that they have mastered the state standard – even at a later date than their peers – their score is changed to reflect their new mastery.

These feedback and differentiated reassessment procedures in a SBG classroom offer a less negative interpretation of SBG non-honors students' higher grade motivation. I view this increase in the grade motivation of my non-honors student as happening for one of five reasons, detailed below.

1. *Hope.* Perhaps non-honors students have never been faced with such a detailed breakdown of their performance on a unit test – and in providing them with areas of weaknesses *and* strengths, non-honors students see that "all is not lost." There is hope that they can still demonstrate to me that they do, indeed, know the material.

2. *Ownership.* Perhaps non-honors students take ownership of their own grades now that they have been handed the keys to reassessment. If they want a better grade, they must do reassessment. By cutting out the ability for them to make excuses as to why they did not master the material the first time through and showing them how to fix their grade, they take ownership of their education.

3. *Me against the world.* Perhaps non-honors students no longer see me, their teacher, as the "bad guy" who gave them the "bad grade." By offering multiple opportunities to be

reassessed, I show my non-honors students that I truly am interested in seeing them do well – otherwise I would just give them their "D" and move on. By tearing down the traditional walls that often separate teachers and students, education can be viewed as a partnership rather than "me against the world."

4. *I learn better this way.* Perhaps non-honors students struggle with traditional standardized tests. Unfortunately, until such tests disappear, students still need to know how to take (and be successful on) these tests. However, such practice can be afforded them in my classroom because poor performance does not necessarily mean they do not know the material. In writing an essay, opting for verbal reassessment, or completing a piece of poetry or a song, these students prove they know the material. Their low performance came not in knowing the material – but in not knowing the test. After being exposed to the content numerous times following assessment (often in a manner that played into their specific learning style), something "clicked." Quite realistically, the mnemonic devices concocted to rhyme portions of the Bill of Rights or the Gettysburg Address for a song written as part of reassessment helps "re-teach" that material in a way that this student can recall when faced with a question on a standardized test about the first 10 Amendments or the significance of President Lincoln's speech. Students take what they missed the first time around and repackage it in such a way that now they are their own teacher. Reassessment effectively gave them a way to learn and retain content information that can be applied to future material and future assessments.

5. *Fear of God.* Perhaps knowing that their parents/guardians, administrators, counselors, and coaches all know that they had two weeks to improve their unit grade… and they chose not to complete any reassessment… puts the onus square on them.

Implications for Practice and Future Research

My SBG classroom that uses differentiated reassessment was found to produce statistically significant gains on the EOCA for my students, with major gains calculated for non-honors students. These students were also found to have more grade motivation than their peers in the non-SBG classes. While reasons for this increase are speculative, statistical analysis did point to my SBG classroom as potentially promoting this change in motivation among non-honors students.

Moving forward, I would like to see future research done on whether male and female students benefited differently (or not at all) by being in my SBG classroom. Data collected from the NAEP from 2000-2007 found that girls in Grades 4 and 8 outscored boys in reading and writing, whereas boys outscored girls in math (Louie & Ehrlich, 2009). Tomlinson and McTighe (2006) interpreted gender gaps as further proof for the necessity of differentiation in every classroom. Thus, future research into the benefit of standards-based curriculum and differentiated reassessments would lend itself nicely to the gender gap discussion.

In addition to examining differences between the gender gap, future researchers could look into the role such a system plays in improving the gap in scores between whites and minority students. Students who receive free-and-reduced meals, students who come from lower socioeconomic backgrounds, students on IEPs, and students who are not native English speakers all provide key demographic test groups that need to be studied in-depth.

Further research should replicate the study with a different subject or with multiple classrooms. Since not many subject areas have teachers that have adopted a SBG classroom (or differentiated reassessment), the pool for such research would be limited. However, at the same school where this study was conducted, the Health and Physical Education Department,

American Government, World History, sociology, psychology, and most of the lower-level math courses have implemented grading policies that offer reassessment.

Is it worth it?

It has been eight years since that fateful conference on grades pointed out my shortcomings as an assessor of student mastery to an auditorium full of my peers. While the biting condemnation of my meager answer of "points" grows less and less painful as the years distance me from such a poorly concocted, "on the spot," knee-jerk response, there is not a summer that goes by without asking myself, "Do I continue this next year?" Am I a better teacher today than I was eight years ago? If I am, is it because of SBG and differentiated reassessment? Since half of my career was spent not using it – and half has been spent serving as SBG's de facto cheerleader – where do I stand *right* now?

I wish I could return to the conference and pose the presenter with the question that I am asked at the end of every conversation about adopting Mastery Teaching and Mastery Learning and overhauling one's entire approach to teaching and grading – *is it worth it?*

It depends. Are you in it for the "As" – or the "Ahhhs"?

When teachers take the plunge into the world of Mastery Teaching and Mastery Learning, they are, in essence, rolling the dice. Such approaches to education always read easier in books and articles – and come across as "manageable" during after-school in-service meetings. In actuality, the initial set-up is like programming the clock on a VCR. While it seems simple – just hold down the red button and press this other one, right? – the fact is, the second you get it set, the power goes out, and eventually you accept the constant blinking reminder of your ineptitude. Installing (and maintaining) a SBG classroom requires an amazing amount of patience and a willingness to frequently explain (and defend) "how it works" to any number of

invested parties (like students, parents/guardians, other staff members, and administration). Providing students with enough (but not too much) post-assessment feedback so they can begin their differentiated reassessment turns every test into a multi-week undertaking. New classes and curriculum changes put SBG teachers on edge when they hear murmurings that administration is going to "shake up" teacher assignments.

And for what? Higher Hake Gains? Grade motivation?

I will admit that I was disappointed when my students did not return higher metacognitive and motivation scores outside grade motivation for non-honors. It takes a lot of work to run a SBG classroom – and the only metacognitive/motivational difference is I successfully transformed my non-honors students into potential grade grubbers? I was discouraged, that is, until I looked back over my students' reassessment for my unit on the Great Depression. As I poured through the poetry, song lyrics, essays, and even a "Hooverville" mini-board game, I remembered why SBG works: it makes school not feel like school for both the student *and* the teacher. I had one student write a short children's book about the Great Depression. He patterned it after Dr. Seuss' *Green Eggs and Ham* and called his version *Green Eggs and SPAM*. Utter brilliance. Another student responded to a blog article about the stock market on a Wall Street website. Yet another had a rousing 15-minute after-school debate with me about whether or not FDR's "New Deal" should be considered a failure by today's economic standards. That is correct. A 14-year-old, non-honors student… talking about a topic most adults do not fully understand… after school… with his teacher… just one week after he missed *every* question about economics on the unit test.

Those are the moments that make SBG and differentiated reassessment worth the time spent after school, late at night, on the weekends, during holiday breaks, and in the summer.

I am in it for the "Ahhhs."

Despite facing a major uphill battle to get students, parents/guardians, colleagues, and administration to "buy in," I am happy to see the impact my approach to education has had on my school. During inquisitive conversations and debates in the staff lounge concerning my new "take" on grading, I often turn to a quote from *The Kite Runner* that hangs in my classroom: *"You can be good again."* Hopefully, the findings of this recent study will contribute to more teachers realizing that every student is capable of mastering their course material, even if that comes weeks after they have been formally assessed.

Limitations

Having access to the SOCA and EOCA of 327 students had the potential to generate a massive amount of data. Unfortunately, my LDS prevented the use of individual SOCA and EOCA scores. While using class averages still generated a significant difference in the Hake Gains for my students and non-SBG students – especially among the non-honors students – it produced a very low effect size (Cohen's *d*). A larger *d* would have been preferred.

I was fortunate to have collected 232 of 327 possible survey responses (71% participation rate). This gave my study a massive sample size, which gave more validity to the results. The identical breakdown of respondents in my classes and the non-SBG classes (116 in each) also contributed to my study's legitimacy. Certainly, having all 327 students cooperate and answer the two surveys would have been ideal, but when dealing with 14 and 15-year-olds, such an expectation is highly unrealistic.

LIST OF REFERENCES

Ahmed, A., & Pollitt, A. (2010). The support model for interactive assessment. *Assessment in Education: Principles, Policy, & Practice*, *17*(2), 133-167. doi: 10.1080/09695941003694425

Ainsworth, L. (2003). *Unwrapping the standards: A simple process to make standards manageable.* Englewood, CO: Lead + Learn Press.

Anderson, L. W., & Block, J. H. (1977). Mastery learning. In Treffinger, D., David, J., & Ripple, R. (Eds). *Handbook of teaching educational psychology.* New York: Academic Press.

Anderson, S. (1994). *Synthesis of Research on Mastery Learning.* Information Analyses. Retried from ERIC database. (ED382567)

Angelo, T., & Cross, K. (1993). *Classroom assessment techniques: A handbook for college teachers (2nd ed.).* San Francisco, CA: Jossey-Bass.

Armstrong, S. (2008). *Teaching smarter with the brain in focus: Practical ways to apply the latest brain research to deepen comprehension, improve memory, and motivate students to achieve.* New York, NY: Scholastic.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: Worth Publishers.

Beck, S. (2009). Individual goals and academic literacy: Integrating authenticity and explicitness. *English Education, 41*(3), 259-280.

Bjork, R. (1994). Memory and metamemory considerations in the training of human beings. In Metcalfe, J. and Shimamura, A. (Eds), *Metacognition: Knowing about knowing*. (pp.185 205). Cambridge, MA: MIT Press.

Black, A., & Deci, E. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education, 84*, 740-756.

Block, J., & Burns, R. (1976). Mastery learning. *Review of Research in Education*, *4*(1976), 3-49.

Bloom, B. (1968). Learning for mastery, instruction, and curriculum. *Center for the Study of Evaluation of Instructional Programs, 1*(2), 2-12.

Bloom, B. (1981). *All our children learning – A primer for parents, teachers, and other educators.* New York, NY: McGraw-Hill.

Bransford, J., Brown, A., & Cocking, R. (2000). *How people learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press.

Brandt, R. (1985). On teaching and supervision: A conversation with Madeline Hunter. *Educational Leadership, 42*(5), 61-66.

Brockett, R., & Hiemstra, R. (1991). *Self-direction in adult learning: Perspectives on theory, research, and practice.* London, England: Routledge.

Brookhart, S. (2008). Feedback that fits. *Education Leadership, 65*(4), 54-59.

Brookhart, S., Walsh, J., & Zientarski, W. (2006). The dynamics of motivation and effort for classroom assessments in middle school science and social studies. *Applied Measurement in Education, 19*(2), 151-184. doi: 10.1207/s15324818ame1902_5

Brown, C. (2010). Balancing the readiness equation in early childhood education reform. *Journal of Early Childhood Research*, *8*(2), 133-160. doi:10.1177/1476718X09345504

Budge, K. (2010). Why shouldn't rural kids have it all? Place-conscious leadership in the era of extralocal reform policy. *Education Policy Analysis Archives*, *18*(1), 1-26. Retrieved from ERIC database. (EJ872436)

Case, B., & Zucker, S. (2005). *Horizontal and vertical alignment.* San Antonio, TX: Pearson Education.

Chapman, C., & King, R. (2005). *Differentiated assessment strategies: One tool doesn't fit all.* Thousand Oaks, CA: Corwin Press, Inc.

Chick, N., Karris, T., & Kernahan, C. (2009). Learning from their own learning: How metacognition and meta-affective reflections enhance learning in race-related courses. *International Journal for the Scholarship of Teaching and Learning*, *3*(1), 1-28.

Cleary, T., & Zimmerman, B. J. (2004). Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the Schools*, *41*(5), 537-550.

Clifford, M. (1986). Comparative effects of strategy and effort attributions. *British Journal of Educational Psychology*, *56*(1), 75-83.

Coutinho, S. (2007). The relationship between goals, metacognition, and academic success. success. *Educate*, *7*(1), 39-47.

Cummins, P., & Davesne, C. (2009). Using electronic portfolios for second language assessment. *Modern Language Journal*, *93*(1), 848-867. doi: 10.1111/j.1540-4781.2009.00977.x

Daniels, L., Stupnisky, R., Pekrun, R., Haynes, T., Perry, R., & Newall, N. (2009). A longitudinal analysis of achievement goals: From affective antecedents to emotional effects and achievement outcomes. *Journal of Educational Psychology, 101*(4), 948-963. doi:10.1037/a0016096

DeKeyrel, A., Dernovish, J., Epperly, A., & McKay, V. (2000). *Using motivational strategies to improve academic achievement of middle school students.* Retrieved from ERIC database. (ED443550)

Dembo, M., & Eaton, M. (2000). Self-regulation of academic learning in middle level schools. *The Elementary School Journal, 100*(5), 473-490.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process.* Boston, MA: Heath.

DuFour, R., DuFour R., Eaker, R., & Karhanek, G. (2004). *Whatever it takes: How professional learning communities respond when kids don't learn.* Bloomington, Indiana: Solution Tree.

DuFour, R., DuFour R., Eaker, R., & Karhanek, G. (2009). *Raising the bar and closing the gap: Whatever it takes.* Bloomington, Indiana: Solution Tree.

Eccles, J., Simpkins, S., & Davis-Kean, P. (2006). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology, 42*, 70-83.

Eccles, J., Wigfield, C., Flanagan, C., Miller, C., Reuman, D., & Yee, D. (1989). Self-concepts, domain values, and self-esteem: Relations and changes at early adolescence. *Journal of Personality*, *57*(2), 283-310.

Ertmer, P, & Newby, T. (1996). The expert learner: strategic, self-regulated, and reflective. *Instructional Science*, *24*(1), 1-24.

Farrington, C., & Small, M. (2008). *A new model of student assessment for the 21st century.* Washington, D.C.: American Youth Policy Forum.

Feldlaufer, H., Midgley, C., & Eccles, J. (1988). Student, teacher, and observer perceptions of the classroom environment before and after the transition to junior high school. *Journal of Early Adolescence*, *8*(2), 133–156.

Fisher, D., & Frey, N. (2007). *Checking for understanding: Formative assessment techniques for your classroom.* Alexandria, VA: ASCD.

Gall, M., Gall, J., Jacobsen, D., Bullock, T. (1990). *Tools for learning: A guide to teaching study skills.* Alexandria, VA: Association for Supervision and Curriculum Development.

Glynn, S., Brickman, P., Armstrong, N., & Taasoobshirazi, G. (2011). Science motivation questionnaire II: Validation with science majors and nonscience majors. *Journal of Research in Science Teaching*, *48*(10), 1159-1176.

Gravetter, F., & Wallnau, L. (2008). *Essentials of statistics for the behavioral sciences (6th ed.).* Belmont, CA: Wadsworth Cengage Learning.

Guskey, T. R. (1987). The essential elements of mastery learning. *Journal of Classroom Interaction*, *22*(2), 19-22.

Guskey, T. R. (1988). *Bloom's Mastery Learning and Hunter's Mastery Teaching: Complement or Conflict?* Paper presented at American Educational Research Association in New Orleans, LA. Retrieved from ERIC database. (ED292808)

Guskey, T. R., & Gates, S. L. (1986). Synthesis of research on the effects of mastery learning in elementary and secondary classrooms. *Educational Leadership, 43*(8), 73-80.

Guskey, T. R. & Pigott, T. (1988). Research on group-based mastery learning programs: A meta-analysis. *Journal of Educational Research, 81*(4), 197-216.

Hamilton, L., Stecher, B., & Yuan, K. (2008). Standards-based reform in the United States: History, research, and future directions. Center on Education Policy. Retrieved from ERIC database. (ED503897)

Hartnell, B. (2011). *Standards-based curriculum, differentiated instruction, and end of course assessments* (Doctoral dissertation). Retried from Dissertations and Theses database. (UMI No. 2297722471)

Hatano, G., & Inagaki, K. (1968). Two courses of expertise. In Harold, S., Azuma, H., and Hakuta, K. (Eds). *Child development and education in Japan*. New York: W.H. Freeman

Herman, J., Aschbacher, P., & Winters, L. (1992). *A practical guide to alternative assessment.* Alexandria, VA: Association for Supervision and Curriculum Development.

Humphreys, D., & Davenport, A. (2005). What really matters in college: How students view and value liberal education. *Liberal Education, 91*(3), 36-43.

Hunter, M. (1982). *Mastery Teaching*. El Segundo, CA: TIP Publications.

Hunter, M. (1985). What's wrong with Madeline Hunter? *Educational Leadership, 42*(5), 57-60.

Jarvela, S., Volet, S., & Jarvenoja, H. (2010). Research on motivation in collaborative learning: Moving beyond the cognitive-situative divide and combining individual and social processes. *Educational Psychologist, 45*(1), 15-27. doi: 10.1080/00461520903433539

Johnson J., Uline, C., & Perez, L. (2014). The quest for mastery. Educational Leadership, 72(2), 48-53.

Kagan, S., Carroll, J., Comer, J., & Scott-Little, C. (2006). Alignment: A missing link in early childhood transitions? *Young Children, 61*(5), 26-32.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*, 32-36.

Karpicke, J., Butler, A., & Roediger, H. (2009). Metacognitive strategies in student learning: Do students practice retrieval when they study on their own? *Memory, 17*(4), 471-479.

Knoblauch, D. (2015, June 22). *Effective Feedback*. Lecture presented at Otterbein University, Westerville, OH.

Koong, C., & Wu, C. (2010). An interactive item sharing website for creating and conducting on-line testing. *Computers & Education, 55*(1), 131-144. doi: 10.1016/j.compedu.2009.12.010

Kulik, C., Kulik, J., & Bangert-Drowns, R. (1990). Effectiveness of mastery learning programs: A meta-analysis. *Review of Education Research, 60*(2), 265-299.

Kulm, G., Dager Wilson, L. & Kitchen, R. (2005). Alignment of content and effectiveness of mathematics assessment items. *Educational Assessment, 10*(4), 333-356. doi: 10.1207/s15326977ea1004_2

Lawson, A., Banks, D., & Logvin, M. (2007). Self-efficacy, reasoning ability, and achievement in college biology. *Journal of Research in Science Teaching, 44,* 706-724.

Lin, Y., McKeachie, W., & Kim, Y. (2003). College student intrinsic and/or extrinsic motivation and learning. *Learning and Individual Differences, 13,* 251-258.

Linn, R., Baker, E., & Dunbar, S. (1991). Complex, performance-based assessment: Expectations and validation criteria. *Educational Researcher, 20*(8), 15-21.

Louie, J., & Ehrlich, S. (2008). Gender gaps in assessment outcomes in Vermont and the United States. Retrieved from ERIC database. (ED502616)

Lovelace, M., & Brickman, P. (2013). Best practices for measuring students' attitudes toward learning science. *Life Sciences Education, 12,* 606-617.

Lund, A., & Lund, M. (2016). Laerd Statistics [Computer software]. The University of Bath, United Kingdom: Lund Research Ltd.

O'Connor, K. (2002). *How to grade for learning: Linking grades to standards (2nd ed.).* Thousand Oaks, CA: Corwin Press, Inc.

O'Connor, K. (2007). *A repair kit for grading.* Portland, OR: Education Testing Service.

Ohio Department of Education. (2008). *Academic content standards source book: K-12 social studies.* Columbus, Ohio: Center for Curriculum and Assessment Publishers.

Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research, 70*(3), 323-367

Martineau, J., Paek, P., Keene, J., & Hirsch, T. (2007). Integrated, comprehensive alignment as a foundation for measuring student progress. *Educational Measurement: Issues and Practice, 26*(1), 28-35. doi: 10.1111/j.1745 3992.2007.00086.x

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543-578.

Paris, S., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. In Jones, B. & Idol, L. (Ed.), *Dimensions of Thinking and Cognitive Instruction* (pp. 15-45). Florence, KY: Routledge Publishing.

Pintrich, P. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice, 41*(4), 219-225.

Pintrich, P., & Schunk, D. (2002). *Motivation in education: Theory, research, and applications (2nd ed.).* Upper Saddle River, NJ: Prentice Hall.

Posner, G., Strike, K., Hewson, P., & Gertzog, W. (1982). Accommodation of a scientific conception: towards a theory of conceptual change. *Science Education, 66*(2), 211-227.

Rabb, T. (2007). Assessments and standards: The case of history. *Education Week*, 36-37.

Reeve, J., Deci, E., & Ryan, R. (2004). Self-determination theory: A dialectical framework for understanding sociocultural influences on student motivation. In D. M. Mclnerney & S. Van Etten (Eds.), *Big theories revisited* (pp. 31-60). Greenwich, CT: Information Age.

Roach, A., & Elliott, S. (2009). Consultation to support inclusive accountability and standards based reform: Facilitating access, equity, and empowerment. *Journal of Educational & Psychological Consultation, 19*(1), 61-81. doi:10.1080/10474410802463320

Roediger, H., & Karpicke, J. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, *17*(3), 249-255.

Rosales, R. (2013). *The Effects of Standards-Based Grading on Student Performance in Algebra 2* (Doctoral dissertation). Retried from Digital Commons of Western Kentucky University.

Schraw, G. (1998). Promoting general metacognition awareness. *Instructional Science, 26,* 113 125.

Schunk, D. (1996). Goal and self-evaluative influences during children's cognitive skill learning. *American Educational Research Journal, 33*(2), 359-382.

Scriffiny, P. (2008). Seven reasons for standards-based grading. *Educational Leadership, 66*(2), 70-74.

Slavin, R. (1989). On mastery learning and mastery teaching. *Educational Leadership, 46*(7), 77-79.

Slavin, R., & Karweit, N. (1984). Mastery learning and student teams: A factorial experiment in urban general mathematics classes. *American Educational Research Journal, 21*(4), 725-736. doi:10.3102/00028312021004725

SPSS. (2016). Statistical Package for the Social Sciences Career Starter Program (Version 23.0) [Computer software]. Chicago, IL: SPSS Inc.

Stallings, J., & Krasavage, E. M. (1986). Program implementation and student achievement in a four-year Madeline Hunter follow through. *Elementary School Journal*, 87, 117-138.

Statistics Solutions. (2016). Intellectus Statistics [Computer software]. California: California State University.

Stockdale, S., & Brockett, R. (2011). Development of the PRO-SDLS: A measure of self-direction in learning based on the personal responsibility orientation model. *Adult Education Quarterly, 61*(2), 161-180.

Tanner, K. (2012). Promoting student metacognition. *CBE – Life Sciences Education, 11*, 113-120.

Tomlinson, C. (1999). *The differentiated classroom: Responding to the needs of all learners.* Alexandria, VA: Association for Supervision and Curriculum Development.

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

Tomlinson, C. (2000b). *How to differentiate instruction in mixed-ability classrooms (2nd ed.).* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. (2003). *Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. (2008). *The differentiated school: Making revolutionary changes in teaching and learning.* Alexandria, VA: Association for Supervision and Curriculum Development.

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

Tung, R. (2010). *Including performance assessments in accountability systems: A review of scale-up efforts.* Boston, MA: Center for Collaborative Education. Retrieved from ERIC database. (ED509787)

Van der Stel, M., & Veenman, M. (2010). Development of metacognitive skillfulness: A longitudinal study. *Learning and Individual Differences, 20*(3), 220-224. doi:10.1016/j.lindif.2009.11.005

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology, 101*(3), 671-688. doi:10.1037/a0015083

Walberg, H. (1990). Productive teaching and instruction: Assessing the knowledge base. *The Phi Delta Kappan*, 71(6), 470-478.

Walker, C., & Greene, B. (2009). The relations between student motivational beliefs and cognitive engagement in high school. *Journal of Educational Research, 102*(6), 463-472.

Weimer, M. (2013). Three ways to help students become more metacognitively aware. *The Teaching Professor, 26*(9), 2.

Weinstein, C. , Husman, J., & Dierking, D. (2000). Self-regulation interventions with a focus on learning strategies. In Boekaerts, M., Pintrich, P., & Seidner, M. (Eds), *Self-regulation: Theory, research, and applications* (pp. 727–747). Orlando, FL: Academic Press.

Wiggins, G. (1993). Assessment: Authenticity, context, and validity. *The Phi Delta Kappan*, *8*(75), 200-208.

Wiggins, G. (2012). 7 Keys to Teaching Content Outrageously. *Educational Leadership*, n.a., 11-16.

Wiggins, G., & McTighe, J. (2005). *Understanding by design (2nd ed.)*. Upper Saddle River, NJ: Pearson Education.

Willent, J., Yamashita, J. & Anderson, R. (1983). A meta-analysis of instructional systems applied in science teaching. *Journal of Research in Science Teaching*, *20*(5), 405-417.

Willingham, D. (2009). *Why don't students like school? A cognitive scientist answers questions about how the mind works and what it means for the classroom.* San Francisco, CA: John Wiley & Sons, Inc.

Wood, R., Bandura, A., & Bailey, T. (1990). Mechanisms governing organizational performance in complex decision making environments. *Organizational Behavior and Human Decision Processes*, *46*(1), 181-201.

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

Zimmerman, B. J. (2002). Achieving self-regulation: The trial and triumph of adolescence. In F. Pajares, F., & Urdan, T. (Eds), *Academic motivation of adolescents* (Vol. 2, pp. 1–27). Greenwich, CT: Information Age.

Zohar, A., & David, A. (2009). Paving a clear path in a thick forest: A conceptual analysis of a metacognitive component. *Metacognition Learning*, *4*, 177-195.

APPENDIX A

Parent/Guardian's Consent for Child and Student Assent to participate in a study for Otterbein University

The Effect of Differentiated Reassessments on the Metacognition and Motivation of 9th Grade Social Studies Students

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Dear Student and Parent/Guardian,

My name is Dr. Benjamin Hartnell, and I am a history teacher at [redacted] High School and a Master's student at Otterbein University. As part of my graduation requirements, I am conducting a research study concerning how students think about their own understanding and learning in school and as it pertains to their 9th grade American History class. This is known as "metacognition". The purpose of this study is to see what effect differentiated reassessment has on making 9th grade American History students more metacognitively aware of their own learning.

I am requesting permission to contact your child (student) to participate in two anonymous surveys about how they learn and about their experiences in their current American History class. These surveys will be administered consecutively during one regular class period. The first survey is called *The American History Motivation Questionnaire* and was created by Shawn M. Glynn in 2011 (originally as *The Science Motivation Questionnaire II*). The second survey is called *A Learning Experience Scale (PRO-SDLS)* and was created by Susan Stockdale and Ralph Brockett in 1991.

Additionally, I am requesting permission to use data collected from district-created, district-approved, and district-mandated Start of Course Assessments (SOCA) and End of Course Assessments (EOCA) for the 9th grade American History classes. All data will be kept confidential and identities protected in the resulting published work.

There is no compensation to students for participating in this project. However, information from the surveys will help in furthering the understanding of metacognition and how students learn. Risks to the participants in this study are minimal and no greater than those faced on a daily, routine basis.

You and your student can choose freely to participate or not to participate. In addition, at any point, you can withdraw your permission, and your student can stop participating without penalty. Students can, on their own accord, also elect to stop participating at any given time. Choosing to participate (or not participate) in the surveys or to the release of SOCA/EOCA will not impact course grades. Students that choose not to participate, or who do not receive permission from their parent/guardian to participate, will work on an enrichment activity during the period in which the surveys are administered. This activity will not be worth any points and is intended for enrichment purposes only. Students that elect to participate will be offered the enrichment activity following the completion of their surveys.

I will not use your name, your student's name, or any other personally identifying information in this project or for any purposes outside the project. I will not make any unauthorized transmittals of confidential information. All data will be maintained in a locked file cabinet at [redacted] High School for a period of three years from the completion of the study. I agree to this and have signed below:

_____ _____

Printed Name of Researcher *Signature of Researcher*

Contacts and Questions:
The researcher's name is Dr. Benjamin Hartnell. The researcher's faculty advisor at Otterbein University is Dr. Paul Wendel. You may direct any questions you have to the researcher by phone (614-797-6200) or by e-mail (benjamin.hartnell@otterbein.edu). You may also contact Dr. Hartnell's advisor by e-mail (pwendel@otterbein.edu). If you want to talk privately about your student's rights as a participant, you may call Dr. Robert Kraft, Director of IRB at Otterbein University at 614-823-1556, extension 1473.

Consent/Assent:
If you (parent/guardian) consent for your student to participate in this project, please sign the following page and return it to your student's 9th grade American History teacher. You are not giving up any legal rights by signing this form.

If you (student) agree to participate in this project, please sign the following page and return it to your student's 9th grade American History teacher. You must also have your parent/guardian's consent in order to participate in this project. You are not giving up any legal rights by signing this form.

Parent/Guardian's Consent for Child to Participate in the Otterbein University Project:

The Effect of Differentiated Reassessments on the Metacognition and Motivation of 9th Grade Social Studies Students

---

Parent/Guardian's Signature for Consent (please check all that apply):

☐ I have read the information in this letter (or have had someone read it to me), and I understand what is being asked of my student well enough to make a decision about granting my consent as it pertains to their involvement.

☐ I give my permission for my student to participate in the two anonymous surveys for this project.

☐ I give my permission for my student's SOCA/EOCA data to be used, anonymously, in this project.

☐ I understand that, in order to participate in this project, my child must also agree to participate.

☐ I understand that my student and/or I can change our minds about participation, at any time, by notifying the researcher of our decision to end participation in this project.

Name of Student (Print): _____

Name of Parent/Guardian (Print): _____

Parent/Guardian's Signature: _____

Date: _____

==========

Student's Assent to Participate in the Otterbein University Project:

The Effect of Differentiated Reassessments on the Metacognition and Motivation of 9th Grade Social Studies Students

---

Student's Signature(s) for Assent (please check all that apply):

☐ I have read the information in this letter (or have had someone read it to me), and I understand what is being asked of me well enough to make a decision about granting my assent (acceptance) as it pertains to my involvement.

☐ I give my permission to participate in the two anonymous surveys for this project.

☐ I give my permission for my SOCA/EOCA data to be used, anonymously, in this project.

☐ I understand that, in order to participate in this project, my parent/guardian must grant permission for me to do so.

☐ I understand that I can change my mind about participation, at any time, by notifying the researcher of my decision to end participation in this project.

Name of Student (Print): _____

Student's Signature: _____

Date: _____

APPENDIX B

[redacted]

[redacted] Principal

October 28, 2015

To the Institutional Review Board (IRB) of Otterbein University:

I have approved Dr. Benjamin Hartnell's use of two surveys among the 9th grade American History students at Westerville North High School, along with the use of data from district-approved Start and End of Course Assessments, as part of his Capstone Project for Otterbein University.

However, student involvement should be cleared by the appropriate parent/guardian before they are involved in the study.

If I can be of further assistance, please feel free to contact me.

Sincerely,

[redacted]

[redacted] Superintendent

Visit us at [redacted]

Vision: Our vision is to be the benchmark of educational excellence.
Mission: Our mission is to prepare students to contribute to the competitive and changing world in which we live.
Values: Respect, Inclusiveness, Community, Communication, Collaboration, Innovation, Nurturing, Trust, Accountability

APPENDIX C

DATA USE AGREEMENT

This Data Use Agreement ("Agreement"), effective as of Thursday, October 29, 2015 ("Effective Date"), is entered into by and between **Dr. Benjamin Hartnell** ("Data Recipient") and [redacted] ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research in accord with the HIPAA and FERPA Regulations.

1. **Definitions.** Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.

2. **Preparation of the LDS.** Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable HIPAA or FERPA Regulations

3. **Data Fields in the LDS.** No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider shall include the data fields specified as follows, which are the minimum necessary to accomplish the research (list all data to be provided): test scores from Start of Course Assessments (SOCA) and End of Course Assessments (EOCA).

4. **Responsibilities of Data Recipient.** Data Recipient agrees to:

   a. Use or disclose the LDS only as permitted by this Agreement or as required by law;

   b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;

   c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;

   d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and

   e. Not use the information in the LDS to identify or contact the individuals who are data subjects.

5. **Permitted Uses and Disclosures of the LDS.** Data Recipient may use and/or disclose the LDS for its Research activities only.

6. **Term and Termination.**

   a. Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

   b. Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

   c. Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

d. For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous.

a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER

Signed: [redacted]

Print Name: [redacted]

Print Title: PRINCIPAL

DATA RECIPIENT

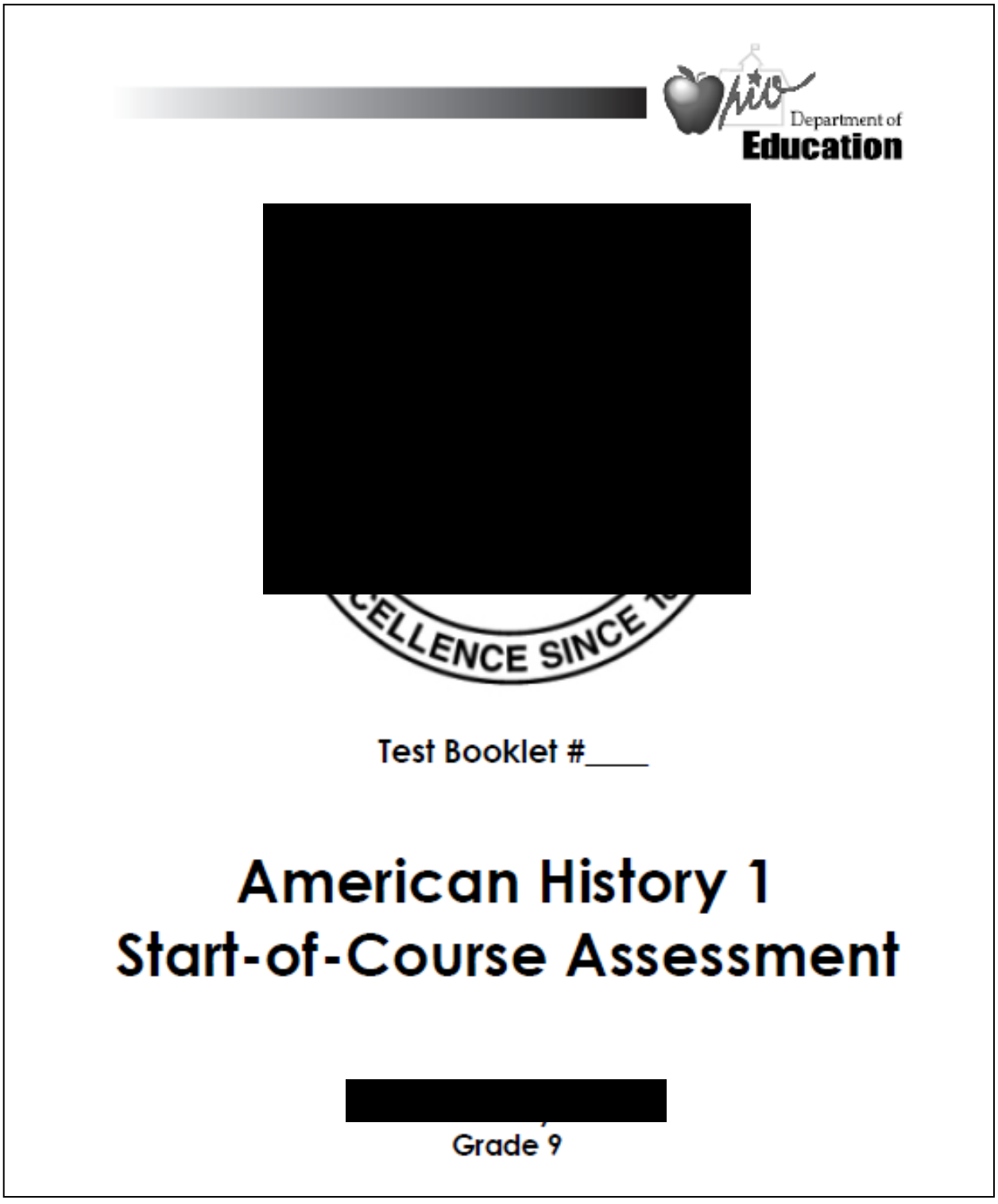
Signed: _____

Print Name: BETH J. HARTNELL

Print Title: EDUCATOR/RESEARCHER

APPENDIX D

NOTE: As this is a SOCA that is still in use, only the cover, instructions, and first examination page have been provided.



TEST BOOKLET

Today you will be taking the **American History 1** ***Start-of-Course Assessment*** for [redacted]. This is an assessment of how well you already understand the material that will be covered this semester and is aligned with Ohio's Academic Content Statements.

Directions: Answer the 35 multiple-choice questions by choosing the **most** correct answer and blackening the corresponding space on your Scantron Form. If you change an answer, be sure to erase the first mark completely.

While your score on this SOCA will **NOT** impact your current grade, you are encouraged to try to do your best.

[redacted] created in 2014

1. Enlightenment philosopher Thomas Hobbes argued that governments resulted from a social contract to maintain an orderly society. John Locke, another Enlightenment philosopher, convinced America's Founding Fathers that a government should be overthrown if it

   A. failed to promise elections.
   B. violated people's natural rights (life, liberty, and property).
   C. failed to protect people from economic inequality.
   D. entered into alliances with foreign governments.

Content Statements #5 & #9

2. This document was written by Congress under the Articles of Confederation, set forth the process by which new states could be added to the Union, and outlawed slavery in Ohio, Indiana, Illinois, Wisconsin, Michigan, and part of Minnesota. What document?

   A. The Bill of Rights.
   B. The Declaration of Independence.
   C. The Federalist Papers.
   D. The Northwest Ordinance.

Content Statements #5, #6, #7 & #8

3. This document intentionally made the Federal Government weak by not having a President, not having any courts, and by creating a 1-house Congress that didn't have the power to tax or draft troops. Its weakness was shown by Shays' Rebellion.

   A. The Articles of Confederation.
   B. The Northwest Ordinance.
   C. The Federalist Papers.
   D. The Bill of Rights.

Content Statements #5, #6, #7 & #8

[redacted] created in 2014

APPENDIX E

OTTERBEIN
UNIVERSITY

Today you will be completing a two-party survey into how you think about learning as well as how you feel about your American History class. All answers will be kept confidential and used as part of an educational study at Otterbein University.

The first part is a 25-question survey called **The American History Motivation Questionnaire**.

The second part is a 25-question survey called **A Learning Experience Scale (PRO-SDLS)**.

For both surveys, you may answer using pen or pencil and place your answer directly in this packet.

Thank you for your participation.

Your teacher (please circle): [redacted]

Your Class Period: _____

Page 1

Participant Background Information

Before beginning, please provide a little background information about yourself. *(NOTE: All information is confidential.)*

1. What is your gender?

O Female O Male O Other O I choose not to answer.

2. What is your race/ethnic origin?

O American Indian/Alaskan Native.

O Asian.

O Pacific Islander/Native Hawaiian.

O Black/African-American.

O Hispanic/Latino of any race.

O Caucasian/White.

O Two or more races.

O I choose not to answer.

3. Please select which statement applies to you:

O I receive services for ESL/ELL.

O I receive services for Special Education.

O I receive services for both ESL/ELL *and* Special Education.

O I do NOT receive services for ESL/ELL *or* Special Education.

O I choose not to answer.

4. How often is English spoken in your home?

O Always

O Most of the time

O Sometimes

O Rarely

O Never

O I choose not to answer.

5. Within the last month (not counting weekends, holiday breaks, or calamity days), how often were you absent from school?

O Never.

O 1 day.

O 2-4 days.

O 5 or more days.

O I choose not to answer.

6. What were your grades like last school year (select ONE answer)?

O I earned mostly As.

O I earned mostly Bs.

O I earned mostly Cs.

O I earned mostly Ds.

O I earned mostly Fs.

O I choose not to answer.

7. What are you most likely to do after you finish high school?

O Attend a four-year college.

O Attend a community college.

O Attend a vocational school.

O Work full-time.

O Join the military.

O I don't know.

O I choose not to answer.

8. How often do you participate in organized activities outside of school (including sports, arts/music, community service, drama, religious/cultural activities, etc.)?

O Not at all.

O A few times a year.

O Once or twice a month.

O Once or twice a week.

O Three or more times a week.

O I choose not to answer.

The American History Motivation Questionnaire

In order to better understand what you think and how you feel about your American History class, please respond to each of the following **25** statements from the perspective of ***"When I am in my American History class…"***

01. ***The history I learn is relevant to my life.***

O Never O Rarely O Sometimes O Usually O Always

---

02. ***I like to do better than other students on history tests.***

O Never O Rarely O Sometimes O Usually O Always

---

03. ***Learning history is interesting.***

O Never O Rarely O Sometimes O Usually O Always

---

04. ***Getting a good history grade is important to me.***

O Never O Rarely O Sometimes O Usually O Always

---

05. ***I put enough effort into learning history.***

O Never O Rarely O Sometimes O Usually O Always

---

06. ***I use strategies to learn history well.***

O Never O Rarely O Sometimes O Usually O Always

---

07. ***Learning history will help me get a good job.***

O Never O Rarely O Sometimes O Usually O Always

---

08. ***It is important that I get an "A" in history.***

O Never O Rarely O Sometimes O Usually O Always

Please continue to the next page...

09. *I am confident I will do well on history tests.*

O Never O Rarely O Sometimes O Usually O Always

---

10. *Knowing history will give me a career advantage.*

O Never O Rarely O Sometimes O Usually O Always

---

11. *I spend a lot of time learning history.*

O Never O Rarely O Sometimes O Usually O Always

---

12. *Learning history makes my life more meaningful.*

O Never O Rarely O Sometimes O Usually O Always

---

13. *Understanding history will benefit me in my career.*

O Never O Rarely O Sometimes O Usually O Always

---

14. *I am confident I will do well on history assignments and projects.*

O Never O Rarely O Sometimes O Usually O Always

---

15. *I believe I can master history knowledge and skills.*

O Never O Rarely O Sometimes O Usually O Always

---

16. *I prepare well for history tests.*

O Never O Rarely O Sometimes O Usually O Always

---

17. *I am curious about discoveries in history.*

O Never O Rarely O Sometimes O Usually O Always

---

18. *I believe I can earn a grade of "A" in history.*

O Never O Rarely O Sometimes O Usually O Always

Please continue to the next page...

19. ***I enjoy learning history.***

O Never O Rarely O Sometimes O Usually O Always

---

20. ***I think about the grade I will get in history.***

O Never O Rarely O Sometimes O Usually O Always

---

21. ***I am sure I can understand history.***

O Never O Rarely O Sometimes O Usually O Always

---

22. ***I study hard to learn history.***

O Never O Rarely O Sometimes O Usually O Always

---

23. ***My career will involve history.***

O Never O Rarely O Sometimes O Usually O Always

---

24. ***Scoring high on history tests matters to me.***

O Never O Rarely O Sometimes O Usually O Always

---

25. ***I will use history problem-solving skills in my career.***

O Never O Rarely O Sometimes O Usually O Always

Thank you.

This completes **The American History Motivation Questionnaire**.

At this time, please proceed to **A Learning Experience Scale (PRO-SDLS)**, which begins on the next page.

Please continue to the next page...

A Learning Experience Scale (PRO-SDLS)

Please select one answer for each statement by placing an "X" in the appropriate box. There are no "right" answers to these **25** statements. These statements pertain to your recent learning experiences in high school and are not just about your experiences in American History (although they may be the same).

ITEM	Strongly Disagree	Disagree	Sometimes	Agree	Strongly Agree
01. I am confident in my ability to consistently motivate myself.					
02. I frequently do extra work in a course just because I am interested.					
03. I don't see any connection between the work I do for my courses and my personal goals and interests.					
04. If I am not doing as well as I would like in a course, I always independently make the changes necessary for improvement.					
05. I always effectively take responsibility for my own learning.					
06. I often have a problem motivating myself to learn.					
07. I am very confident in my ability to independently prioritize my learning goals.					
08. I complete most of my high school activities because I WANT to, not because I HAVE to.					

Please continue to the next page...

ITEM	Strongly Disagree	Disagree	Sometimes	Agree	Strongly Agree
09. I would rather take the initiative to learn new things in a course rather than wait for the instructor to foster new learning.					
10. I often use materials I've found on my own to help me in a course.					
11. For most of my classes, I really don't know why I complete the work I do.					
12. I am very convinced I have the ability to take personal control of my learning.					
13. I usually struggle in classes if the teacher allows me to set my own timetable for work completion.					
14. Most of the work I do in my courses is personally enjoyable or seems relevant to my reasons for attending high school.					
15. Even after a course is over, I continue to spend time learning about the topic.					
16. The primary reason I complete course requirements is to obtain the grade that is expected of me.					

Please continue to the next page...

ITEM	Strongly Disagree	Disagree	Sometimes	Agree	Strongly Agree
17. I often collect additional information about interesting topics even after the course has ended.					
18. The main reason I do the course activities is to avoid feeling guilty or getting a bad grade.					
19. I am very successful at prioritizing my learning goals.					
20. Most of the activities I complete for my high school classes are NOT really personally useful or interesting.					
21. I am really uncertain about my capacity to take primary responsibility for my learning.					
22. I am unsure about my ability to independently find needed outside materials for my courses.					
23. I always effectively organize my study time.					
24. I don't have much confidence in my ability to independently carry out my student plans.					
25. I always rely on the teacher to tell me what I need to do in the course to succeed.					

END OF SURVEY.

Please return survey to your teacher.

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