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### What Do You Mean I Got a D+? Effects of Feedback Type and Quality on Academic Performance, Metacognition, and Motivation in High School Students

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What Do You Mean I Got a D+?

Effects of Feedback Type and Quality on Academic Performance,  
Metacognition, and Motivation in High School Students

A Thesis submitted in partial fulfillment for the Bachelor's Degree in Psychology

Daisuke Katsumata

Trinity College

Fall 2017 - Spring 2018

### **Acknowledgements**

This thesis project is the culmination of a year's worth of toiling and represents the invaluable contributions of many individuals whether they are aware of their role or not.

Foremost, I owe a deep debt of gratitude to my thesis advisors, Professor Dina Anselmi and Professor Reuman. Time and again, I have benefitted from your patient and wise guidance as I take my first substantial steps as a psychology researcher. You have supported my aspirations, accommodated my curiosity, and expanded my intellectual horizons. I am the thinker I am today because of you. I will continue to seek your counsel in the future. Thank you.

I am incredibly grateful to my community research partner, Ms. Avery for graciously providing her class time and wisdom. This project would not have been the same without her flexibility and ingenuity. Thank you to the students who participated in my study, it was a joy to get to know all of you and I hope you all go on to accomplish great things.

I want to acknowledge my fellow thesis partners: Adelaide Jenkins, Jillian Ramsay, and Michelle Treglia; the research assistants from the Metacognition Research Lab: Chelsea Armistead, Maddie Kane, Phuong Nguyen, Jake Vargas, and Dehryen Williams; my fellow thesis writers-in-arms in the Psychology Senior Thesis Colloquium: all 18 of you, you know who you are; and the participants from the Community Learning Research Fellows Program (in particular, Professor Carol Clark and Professor Diane Zannoni). The office staff of Ann St. Amand, Roxane Porter, and the student worker who assisted me in my data collection efforts. It really meant a lot to me to have the privilege of embarking on this journey alongside all of you.

I would not have been able to come this far without the support of my friends and family. You have all made a difference in my life. I also want to extend my thanks to my professors at Mercer County Community College. You prepared me for this until I finally became ready.

**Table of Contents**

Acknowledgements .....	2
Table of Contents .....	3
Abstract .....	7
Introduction .....	8
Feedback .....	10
What constitutes academic feedback. ....	11
Four core tenets of effective feedback. ....	15
Metacognition .....	22
Metacognition and feedback. ....	22
Metacognition and academic performance. ....	23
Components of metacognition. ....	24
Motivation .....	27
Motivation and academic performance. ....	27
Motivation and feedback.....	28
Motivation and metacognition. ....	28
Key indicators of motivation. ....	29
Implications of Research.....	33
Current Study .....	35
Hypotheses .....	35

Academic performance. ....	35
Metacognition. ....	36
Motivation.....	36
Perceptions of Feedback. ....	36
Method .....	36
Participants.....	36
Measures .....	39
Demographic information. ....	40
Metacognition 5 (MC5). ....	40
Self-Efficacy. ....	40
Achievement Values. ....	41
Test Anxiety.....	41
Intrinsic Goal Orientation. ....	42
Extrinsic Goal Orientation. ....	42
Control of Learning Beliefs. ....	43
Academic performance measures (Unit Test).....	43
Perceptions of Feedback (PoFB). ....	44
Procedure .....	44
Feedback manipulation. ....	44
Results.....	45

## Correlations among Measures of Metacognition, Motivation, Feedback, and Academic

Performance .....	45
Effects of Feedback Condition and Time .....	46
Academic Performance .....	46
Motivation.....	46
Perceptions of Feedback. ....	48
Summary of All Other Repeated-measures ANOVAs .....	48
Discussion .....	48
Academic Performance .....	50
Metacognition .....	53
Motivation.....	55
Perceptions of Feedback .....	61
Conclusions.....	63
Limitations and Future Research .....	64
References.....	68
Tables.....	75
Figures.....	80
Appendices.....	85
Appendix A.....	85
Appendix B .....	86

Appendix C .....	87
Appendix D .....	92
Appendix E .....	94
Appendix F .....	95
Appendix G .....	97
Appendix H .....	98
Appendix I .....	99
Appendix J .....	100
Appendix K .....	110
Appendix L .....	116
Appendix M .....	117
Appendix N .....	118
Appendix O .....	119

### **Abstract**

Numerous studies have established that feedback is among the most effective ways to improve student achievement. However, not all studies have defined feedback in the same way, so the effectiveness of feedback has depended on how it has been defined and the context in which it was provided (Hattie & Timperely, 2007). This study investigated the effects of a feedback intervention on student academic performance, metacognition, and motivation. The students in the study came from two sections of a high school world history class at an inter-district magnet school in Hartford, Connecticut. All feedback was provided by the same teacher over the course of a 4-week instructional unit. Students in the experimental group received elaborated written comments that detailed strengths in their work along with one specific area for improvement, but grades were withheld until the end of the instructional unit, whereas students in the control group were given brief written comments about their work along with grades after each assignment in the instructional unit. The effectiveness of the feedback intervention was assessed by having students take a knowledge-based test before and after the intervention. Metacognition and motivational variables (self-efficacy, achievement values, test anxiety, extrinsic and intrinsic goal orientation, and control of learning beliefs) were also assessed at both time points. Student perceptions of the usefulness of feedback were also collected before and after the unit to assess the level of engagement students had with the feedback they received. As predicted, the feedback intervention found significant effects for academic performance and some measures of motivation, but found no effects on metacognition, most measures of motivation, and perceptions of feedback. Implications of the study's findings are discussed in terms of processing feedback as a multidimensional skill.



### Introduction

“We had the experience, but missed the meaning”<sup>1</sup>

It is June. Summer, with its ocean blue skies and care-free clouds wafting overhead, has made itself felt for weeks now, even if still unofficially. It is a busy time in high school as students wrap up the school year before they are finally released for the summer. Some of the students have gotten back their grades for their assignments and the laws of physics are momentarily suspended, with nitrogen, oxygen, carbon dioxide, etc. being replaced with anticipation, anxiety, and teenage *je ne sais quoi* of “I just can’t even anymore!” There are whispers of “What did you get?” along with faces of shock—some stifled, others worn unabashedly—occasionally followed by, “Wow, I had no idea I was doing this bad, thanks for telling me *now*!” The swirling maelstrom of triumph and anguish that could rival the New York Stock Exchange seems to be generated by a couple of letters or a few digits scribbled on stapled sheets of paper. Hardly any of the students seem to be worried about the comments that accompany them, let alone if they will remember anything of what they have been taught all year. Across the country, this scene repeats itself as summer vacation approaches.

It may be understandable that the students are excited about starting their summer vacation, and for some this may even inspire a sense of nostalgia. However, there are details in that scene worth a closer look. One of the “Bushisms” of former president George W. Bush captures the spirit of inquiry, “Rarely is the question asked, is our children learning?” Foremost to note is the marked fixation on grades by students. To students, grades are the be-all and end-all of their efforts in the classroom, the final tally of whether they have measured up to expectations of their teachers, their families, their peers, their school, the state, and themselves.

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<sup>1</sup> T.S. Eliot, *T.S. Eliot Reading our Quartets* (New York: Caedmon, 1970), 39.

Therefore, for students the focus is on their performance rather than on any feedback they might have received to help them improve their learning. And as easy as it is to understand the simple measurements of a grade (Was the letter near the beginning of the alphabet? Was the number high?), exactly what it measures—including what students are presumably there for in the first place, learning—is not so clear. The shocked and frustrated outburst of the student (“Thanks for telling me *now!*”) is also important to consider. For such students, their expectations were betrayed. However, the ultimate tragedy may not be the less-than-expected grade, but an opportunity for learning that will be squandered when these students see the grade as an endpoint and not a beginning; as a period in their sentence of learning and not as a comma. For how are students to show that they have learned from their mistakes and grown if they only receive feedback on their performance at the conclusion of the lesson? It is not difficult to see how students growing up to these experiences can become less motivated to learn and carry that attitude with them as they approach adulthood.

The idea that students’ learning can be evaluated summatively (as an indicator of current performance; grades) and formatively (as a bridge towards future performance; comments) is not a recent development (Scriven, 1967). Various scholars have questioned the use of grades in classroom assessment as a pedagogical tool or explored the use of formative evaluation as an alternative method of evaluation (Kohn, 1999, 2011; Allen, 2005; Lipnevich & Smith, 2008). Summative assessments in the form of grades, standardized test scores, etc. can be important, if transient indicators of student success and learning. These evaluations are often used as predictors of future performance, but they are far from perfect. Students realize this. They understand that as much as the adults may harp about the importance of learning in the classroom, grades mean something. What is important to recognize is that if learning is truly

important, then the way students are evaluated must not only accurately capture what was learned but nurture it. That is the essence of formative assessment.

## **Feedback**

Feedback in the classroom is ubiquitous and inevitable. Some of the most recognizable forms of feedback are the numbers and letter grades given by teachers on exams and papers that serve as an evaluation of students' performance. There are other forms of feedback as well, such as written comments and scoring rubrics. Overall, feedback has been shown to be among the most powerful factors in student learning and academic achievement, but this impact is not always positive (Hattie & Timperley, 2007). Clearly, there is nuance to feedback. It is critical to understand how feedback works, since feedback is a persistent aspect of the classroom with the potential to influence student learning (for better or for worse). It is not, however always easy for teachers to get it 'right.' Moreover, it should not be forgotten that while focusing on how feedback is given is crucial, so is recognizing how it is received. Providing students with helpful information may still not necessarily motivate them to make changes.

Evidence suggests that student characteristics also play a vital role in learning and academic achievement. These characteristics include metacognition (Flavell, 1979; Ambrose, Bridges, DiPietro, Lovett, & Norman 2010), motivation (Wigfield and Eccles, 2000), and beliefs about learning (Dweck, 1986). A frustrating and not uncommon occurrence for teachers is that despite their best efforts, some students seem to repeat the same mistakes over multiple assignments and stagnate in their learning. It seems intuitively obvious that to turn around such situations, providing students with high quality feedback with information necessary to improve their understanding of the learning material is key. The change however, must ultimately come from the students. One concept that might help students better utilize teacher feedback, as well

as, improve overall academic performance is metacognition. Other factors include various motivational variables such as self-efficacy, intrinsic motivation, the value placed on the importance and relevance of course content, and anxiety towards evaluation.

**What constitutes academic feedback.** As there are many types of feedback including verbal, written, teacher-to-student, peer-to-peer, self, etc., it is necessary to first specify the type of feedback that will be addressed here. Feedback includes any information written by the teacher that is in response to students' performance or understanding in an assignment and with will often call attention the areas in which students did well or poorly. Feedback has an inherently diagnostic element when defined this way but the quality of information exists on a spectrum. For example, a check mark may indicate that an assignment was completed but little else, while a rubric marked with comments may give students a detailed assessment of their work, even though both can be considered feedback.

Feedback in the classroom is given in a dynamic social environment. This means that students may seek out feedback on their own without being prompted to or infer feedback even when it is not explicitly given (Hattie & Timperely, 2007). Even within the narrow confines of teacher-provided written feedback, a lack of any markings on students' work may indicate to them that there were no problems, or that there was nothing good to note. Feedback is a form of communication after all, of which a defining feature is that 'no communication' is a form of communication.

*Grades.* Grades are pervasive in the classroom across all age groups and are an important form of feedback. They signal to students that their performance has been assessed, and the feedback is distilled into the form of a single letter or number. While grades may represent a simple indicator of performance, they broadcast critical information to students.

Feedback in the form of grades generally enhances ego involvement, rather than task involvement of students (Clarke, 2005). Ego involvement stands in contrast to task involvement by leading students to compare themselves with their peers by focusing on their social standing, rather than encouraging students to think about the task itself and ways to improve on it (Black, Harrison, Lee, and Williams, 2007). Grades may exacerbate these effects; as several studies have suggested that grades that are given for every piece of work inevitably lead to complacency or demoralization, impeding deep learning for students (Clarke, 2005). Students who continually receive grades that they are satisfied with can become complacent as they are inundated with positive reinforcement about their sense of self as high-achieving students, while students who are continually told that they are performing poorly will internalize their “poor performance” as part of their identity and demoralization can set in. A focus on performance can also undermine the importance of effort, further damaging the self-esteem of low performers (Black et al., 2007, Craven, Marsh, & Debus, 1991). For high performers, the situation is hardly better. Affirmations of high performance can be construed as praise, which may have very little to do with understanding the learning material better and is therefore rarely effective in increasing learning (Hattie & Timperley, 2007).

An influential review of feedback by Kluger and DeNisi (1996) revealed that when people are only told whether they have done well or poorly, they were not likely to improve on the task. The effectiveness of feedback was increased when information on correct, rather than incorrect responses were given, and when the participants built on changes from previous attempts (Kluger & DeNisi, 1996). The review also included a meta-analysis, which found that feedback did not always have positive effects. However, when feedback identified gaps and connected them to steps on closing the gap, learning improved (Kluger & DeNisi, 1996).

*Comments as a superior form of feedback.* Although not as pervasive as grades, comments can also be commonly found in the classroom. However, comments can have the advantage over grades in terms of how elaborate and on target they are in providing students with information on their performance. Good feedback is nearly synonymous with good comments. Given how comments can vary more in quality than grades can, it may seem as though comments and grades are difficult to compare. Even though comments can vary in quality, research suggests that comments have repeatedly been found to be superior to grades in terms of engaging student learning and boosting performance (Butler, 1988; Black & Wiliam, 1998; Hattie & Timperley, 2007).

Butler (1988) conducted a pivotal study showing comments to be more effective than grades in learning tasks. One important insight to come from this work was that students who received comments without grades performed better than students who received grades or grades and comments. Given the power of comments, it may seem surprising that grades combined with comments were no better than grades alone and inferior to comments alone. It appears that grades can shut down genuine learning, even when combined with comments—the grades naturally overwhelm the usefulness of teacher comments. To understand why, it is important to see what makes teacher feedback in the form of comments so powerful.

*Normative and improvement-focused feedback in summative and formative assessments.*

Normative feedback is corrective in showing discrepancies between students' performance and a reference standard, and invites social comparison among peers (Ames, 1992). Typically, it is also a prominent feature of summative assessment. Normative feedback is often, but not always the means through which summative assessment is carried out. In practice, summative assessment is done near the completion of students' work with the purpose of

summarizing their achievements, and often will have little impact on learning that occurs subsequent to the assessment (e.g., retaking an exam). However, summative assessment can have a great impact on future opportunities, such as passing classes to graduate high school, or grades being a major factor for college admission (Sadler, 1989). Summarizing achievements in this way can be useful in allowing for comparisons of student performance across large numbers in many different learning environments, but it is not always clear for whom the assessment data are intended or how they will make use of it (Black & Wiliam, 1998). These practices can lead to the problem of students being assessed without a clear purpose, while they are left with little useful feedback on how to improve their learning and saddled with future consequences based on their current performance and not their capacity to adapt and learn.

In contrast, improvement-focused feedback is about maximizing the learning gains of an individual student; providing an accurate snapshot of the student's current performance is only important insofar as it advances the student's understanding of the learning material. Improvement-focused feedback is a hallmark feature of formative assessment, but they are not always synonymous. It is important to note that feedback in formative assessment has a reciprocal relationship between students and teachers. Both students and the teachers make their adjustments based on previous performance or to a reference standard, so that closing the feedback loop is important to both parties. Students will thus take the information from the teacher's comments to fill gaps in their knowledge, while teachers can take that same knowledge of the students' gap in knowledge to further tailor future feedback. The goal of formative assessment is for students to learn better than by simple trial and error or from forms of feedback that provide little guidance on improvement (Sadler, 1989). To close the feedback loop for individual students, formative assessment is focused on the personalized outcome of individual

students, but formative assessment can also be provided effectively to small groups of students (Black & Wiliam, 1998).

While summative and formative assessments may seem almost antithetical to each other when paired with normative and improvement-focused feedback, respectively, Black and Wiliam (1998) suggest that there is overlap between formative and summative functions of assessments. A summative assessment provided as an end of a unit test can be paired with improvement-focused feedback and function formatively if the student is able to get helpful feedback on what to improve on in the future. In this sense, the improvement-focused feedback will not impact performance on the unit that concluded, but may help the student aim to do better for the next one (Gedye, 2010). In comparison, a formative assessment given on daily homework assignments can be paired with normative feedback, but not function formatively if the feedback is impoverished and provides little guidance for improvement—even if it was provided with the intention of helping the student improve (e.g., “Explain more.”) (Gedye, 2010). Assessments cannot be simply identified as summative or formative based on if they are graded or not, or if they have comments on them or not (Gedye, 2010). In striving to provide effective feedback, teachers must focus on function over form. The question is not, “Am I giving comments instead of grades?” it is, “Are my assessment methods helping my students understand what they are doing well, what they need to improve?”

**Four core tenets of effective feedback.** Pedagogically, there are at least four core ideas that effective forms of feedback tend to share. Feedback must be specifically targeted to the individual; the timing and situational context of providing feedback matter; the quality and amount of feedback are critical; and while feedback can be powerful, its power lies in being a catalyst for refining what has been learned, not as a substitute for teaching what has not. These



principles are not necessarily mutually dependent on each other, however, multiple studies have posited that in practice, effective feedback often shares these key ideas in one form or another (Hattie & Timperely, 2007; Gedy, 2010).

*Feedback is individualized.* In the classroom, no two students bring with them the same background and prior knowledge. For feedback to be effective, it must be sensitive to these individual differences. Teachers must therefore give specific and individualized feedback for each student so that the gap may be closed between the student's current understanding of material and the goals of a particular test or assignment (Sadler, 1989; Clarke, 2005). Here, the difference between providing students with corrections and prompting them to pursue opportunities for improvement is crucial. Providing corrections points out to students what their mistakes were, but may also take the form of suggestions on how to fix things in vague ways, or repetition of original directions. Presenting students with improvement prompts gives them something concrete to work with and can be broadly broken down into three categories: reminder prompts, scaffold prompts, and example prompts (Clark, 2005). Reminder prompts are simple repetitions of the learning objectives, which may differ from the explicit directions on the assignment as would be the case with a simple repetition when providing corrections. Rather, reminder prompts involve cuing students about what the assignment is implicitly asking for as an acceptable answer; they are better suited for students who are already highly successful in the learning process. Examples of reminder prompts include, "Say more about..." or "Explain why you think this..." (Clark, 2005, p.87). Scaffold prompts are more structured and involve teachers suggesting examples and ideas but in words and phrases so as not to 'give away' a free answer. This type of prompt is appropriate for most students as it strikes a balance between guiding students towards an acceptable answer, while not being so heavy-handed as to stifle self-

discovery and learning. The following is an example of a scaffold prompt: “Say more about saturation. How much salt was used? How did you know saturation had been reached? When exactly was it reached?” (Clark, 2005, p.85). Example prompts are the most labor-intensive for the teacher as an exact answer(s) is modeled for students to choose from or base their own answer on. Example prompts can be particularly effective for supporting students who are having difficulties with the lesson by showing exactly what is expected, thereby closing the gap between students’ understanding and the learning objectives of the lesson. For teachers, forming effective example prompts can help them think about what they expect from their students on assignments and how to make those expectations clear (Gedye, 2010). An example prompt can take the form of the following (in the context of providing guidance on how to properly articulate a key lesson idea):

“Choose one of these statements and/or create your own.

Harold was unlucky because he had fought another battle against Norwegians

Or

Harold had a lot of bad luck particularly having to fight William soon after the Battle of Stamford Bridge.” (Clark, 2005, p.87).

There are a few caveats for teachers providing this sort of feedback. Improvement prompts are not suitable for all assignments and are better paired with assignments that have specific learning objectives rather than those that are about the applications of skills.

Assignments that test the applications of skills require so many different elements to come together, that it may be difficult to identify distinct areas of success and failure that are not interdependent with other components of the skill being tested. Improvement prompts work best when these components can be isolated and improved individually, and this may be too time

consuming to be feasible in most classrooms. Assignments that test closed skills are also ill-suited for improvement prompts. These assignments emphasize the planning and execution of skills, and evaluation is often limited to if the proper strategy was selected, or if the skill was executed correctly. A simple example of using a closed skill in an assignment is to select the proper algorithm for a math problem and then follow it step-by-step to solve for the answer. In such instances, identifying successes (e.g., you selected the correct algorithm, or you correctly carried over the digits in your calculations, etc.) and failures (e.g., remember what this formula means, always remember to pay attention to the decimal place, etc.) becomes trivial (Clark, 2005). According to Clark (2005), students in many UK schools scored higher on tests within a year when improvement prompts began to be utilized by teachers. Specifically, teachers used a system that pointed out three successes and one area for improvement for each student.

*Timing of feedback and the feedback loop.* The old phrase, “strike while the iron is hot,” is an apt metaphor for feedback. Generally speaking, the ideal timing for feedback is as soon as possible after students submit their assignment (Kulik & Kulik, 1988; Hattie & Timperley, 2007). After having received feedback on their performance, students should then be given a chance to reflect on the feedback and apply it either in revising the assignment or on another, similar assignment. This process of completing a task, getting feedback on it, and then having a chance to make adjustments based on the feedback received can be called a feedback loop. Closing the feedback loop allows students to consolidate their overall learning, which may allow them to avoid repeating the same mistakes in the future from forgetting the feedback that they had previously received (Sadler, 1989; Clarke, 2005; Gedy, 2010). When teachers give students opportunities to make use of the feedback that they have provided, the teachers are then able to reassess students’ performance to check if the feedback has led to an increased understanding of

an assignment and improvement in skills (Gedye, 2010). Teachers can present students with such opportunities by: allowing the re-submission of the assignment, giving another assignment of a similar type, or giving an assignment that incrementally builds on the learning objectives and skills from the previously evaluated assignment. Therefore, the ideal timing for feedback lies at the interval between when students complete assignments (Hattie & Timperley, 2007). Well-timed feedback acts as a glue that binds assignments together to provides a sense of continuity and progress for students as they learn.

*Amount of feedback.* Like other forms of learning, it is critical to prevent cognitive overload when giving feedback. Several studies have asserted that students often receive too much feedback and find it overwhelming to know what to focus on for improvement. This may be especially the case when well-intentioned teachers become overzealous and attempt to deliver to their students feedback that is high in both quality and quantity. Therefore, feedback should be prioritized and limited to as little as three pieces of information (Lunsford, 1997). This idea is similar to the ‘three successes to one area of improvement’ system that Clarke (2005) has seen used in UK schools, as overall achievement outcomes improved when students were asked to focus on a few key areas of improvement at a time.

The notion of limiting the number of items of feedback is not merely because processing lots of high quality feedback can be overwhelming; the same can be said for large quantities of superficial feedback. Many students and teachers may unfortunately be familiar with the sight of a paper covered in red ink, marked up with tons of corrections. The information contained within each individual correction may be superficial, such as pointing out spelling or grammatical errors (Clarke, 2005). However, taken collectively as on a heavily marked up paper, too many corrections may have a similar effect as too much feedback on students (Gedye, 2010).

Superficial corrections may not be very useful for general evaluation with respect to grasping key lesson ideas, as they are ineffective when used en masse.

Limiting the amount of feedback teachers present to students underscores a larger point about the role of feedback in not just showing students what to improve and how, but acknowledging that feedback is only effective if students make use of it. On a practical level, limiting the amount of feedback also allows teachers to track if their feedback is being used. Students who are overwhelmed from too much feedback are less likely to make use of feedback and consequently be less effective learners. Likewise, teachers who have difficulty tracking their students' progress will in many cases be less effective as educators. More is not always better.

*Pedagogical role of feedback.* Well-constructed written feedback can allow students to check their understanding of learning material and correct any errors, allowing them to extend their understanding even further (Kulhavy, 1977). But, as potent as feedback is in augmenting student knowledge, it is not a panacea for every type of knowledge failure. Feedback ideally facilitates an adjustment or refinement of what each student already knows, which may entail faulty interpretations. It is ineffective or even demoralizing if feedback is misused to address a students' total lack of understanding (Hattie & Timperley, 2007). This is because with faulty interpretations, students will at least have some mental framework in which the feedback they receive can be incorporated. When students fail to comprehend the learning material at all, there is essentially no context for feedback to be helpful (Kulhavy, 1977). For instance, if a high school history student understands the events leading up to World War II and their significance in how the war broke out, but makes mistakes on the order of events or how the events precipitated one another, then feedback can still be effective by clarifying the relationships between the events. If another student in the class fails to even grasp what the events were or

why they are significant, then what is needed is not further feedback but instruction. Of course, students' grasp of the learning material will vary. In cases in which students are not completely lost but still have difficulty understanding, an example prompt can be helpful (Clarke, 2005). These students may not need wholesale instruction, but specific help with developing a mental framework of the lesson. In these cases, an example prompt (e.g., showing an example of how two of the events leading up to WW II are related to each other) may provide a solid basis from which to build the necessary mental framework (e.g., students may then be able to start connecting the events together).

In the past, some behaviorist models have posited feedback as a mechanism for reinforcement; that is, feedback is information provided to learners about their performance and the learners do more of the things that they got positive feedback on and do less of things that they got negative feedback on (Hattie & Timperley, 2007). Kulhavy (1977) found this to not necessarily be true, as feedback can be rejected, modified, or accepted. As previously suggested, feedback is given and received in a dynamic social environment. Since feedback is a form of communication, it is also susceptible to distortions and failures of interpretation. There are three major points of failure to note: students may reject the feedback outright and not listen to the feedback; students may be motivated to accept the feedback but fail to understand what it means and not act on it; and students may be motivated to accept the feedback and act on it, but misinterpret what it meant. Ideally, students value feedback enough to accept it, are aware of when they do not understand the feedback and ask for clarification, and are given an opportunity by teachers to close the feedback loop. In this optimal scenario, feedback may act as a reinforcement mechanism. But, this is not always the case in practice. Accordingly, feedback may not have a direct role in improving learning outcomes (Hattie & Timperley, 2007).

## **Metacognition**

Metacognition was introduced by Flavell (1979) as a theoretical construct in educational research. Flavell described metacognition as the knowledge of one's own cognition and the monitoring of one's own various cognitive processes, including memory and comprehension. Even at the time of his seminal article, Flavell saw the educational potential of metacognition in schools and its role in understanding the myriad forms of feedback that students face both inside and outside the classroom. Since its introduction, research on metacognition has had a strong influence on educational practices (Hattie, Biggs, & Purdie, 1996; Hattie & Donoghue, 2016). Metacognition figures prominently in models of self-regulated learning, which includes an a number of different variables that are believed to influence learning (Panadero, 2017). There are various models of self-regulated learning (Panadero 2017). According to Schraw, Crippen, and Hartley (2006), self-regulated learning is composed of three parts, of which the metacognition component serves a distinct role compared to the other two components of cognitive strategies and motivation. This suggests that metacognition enables individuals to track their current knowledge and skill levels, optimally plan their allocation of limited learning resources, and evaluate their current level of learning Schraw et al. (2006).

**Metacognition and feedback.** Feedback and metacognition have been linked together in theoretical models of learning. Butler and Winne (1995) reviewed research on self-regulated learning and feedback in the educational and psychological literatures and found that while there are a small minority of students who learn effectively by actively seeking out or even self-generating feedback, this is not the case for a vast majority of students. Therefore, they proposed that feedback can function to help facilitate metacognitive thought patterns by externally providing five types of information. The first type of information is that feedback can confirm to

students when their understandings or beliefs match with what they are being taught. The second type is that feedback can help students add information when their current understanding is correct, but incomplete. The third type is how feedback can alert students when their understanding is fundamentally incorrect or inappropriate and help them overwrite the mistaken information. The fourth type is that feedback can help students tune their understanding in situations in which they have a basic grasp of the concepts but still have not mastered distinguishing between similar concepts or understanding the conditional nature of applying any rules about the concepts. The fifth type is that feedback can show students their current knowledge framework is incompatible with the new material being taught and they need to restructure it to continue learning.

**Metacognition and academic performance.** Metacognition has garnered a lot of attention as an educational intervention within the framework of self-regulated learning (Dignath & Büttner, 2008). Dignath and Büttner's (2008) meta-analysis echoed a finding by Hattie et al. (1996) that the interventions that were most effective at boosting academic performance were situated within a classroom context and based on metacognitive theories. Within the expansive literature of metacognitive intervention studies, several are worth noting.

Paris, Cross, and Lispon (1984) tested the effects of teaching students metacognitive skills and found that students who had received a metacognitive intervention had larger gains in reading comprehension compared to those who did not. This result was replicated more recently with eighth-grade students learning physics (Zepeda, Richey, Ronevich, & Nokes-Malach, 2015). In this study, students received a six-hour intervention that taught them how to plan, monitor, and evaluate their learning. The students who received the intervention improved in their metacognitive awareness and performed better on tests of academic achievement.



More broadly, levels of metacognition have also been shown to be strongly correlated with academic achievement. A study looking at the metacognition levels of final year college students in India found that students with higher levels of metacognition consistently achieved higher marks on their final year examinations, even after controlling for major, gender, and if the students came from urban or rural colleges (Nongtodu & Bhutia, 2017).

Other studies have looked at the predictive power of metacognitive abilities for academic achievement. Gomes, Golino, and Menezes (2014) investigated whether specific and general metacognitive abilities were related to specific and general academic achievement, after controlling for the effects of intelligence in Brazilian sixth to twelfth grade students. Specific and general metacognitive abilities were defined similarly to Schraw's (1998) concept of domain-specific and domain-general metacognition. Schraw proposed a theory that metacognition had a domain-specific component that was limited to specific school subjects or domains, and a domain-general component that could be generalized from one subject to another, or between domains. Gomes et al.'s (2014) categories of specific and general academic achievement followed a similar organization; specific academic achievement was measured by an indicator of arithmetic ability, while general academic achievement was indicated by annual grades in Portuguese, Brazilian, Mathematics, Geography and History subjects. Researchers found that metacognition, rather than intelligence was a better predictor of academic achievement. In particular, general academic achievement was best predicted by general metacognitive ability and specific academic achievement was best predicted by specific metacognitive ability.

**Components of metacognition.** As the benefits of stimulating metacognition in the classroom have become clearer both conceptually and empirically, progress has been made in mapping out conceptual models of metacognition onto measures for investigating the use of

metacognition in the classroom. Schraw and Dennison (1994) developed the Metacognitive Awareness Inventory (MAI) based on two major components of metacognition, knowledge about cognition and regulation of cognition and were able to ascertain that their measure reliably assessed two kinds of metacognitive knowledge. Measures of what students knew about themselves, cognitive strategies, the optimal conditions for those strategies corresponded to knowledge about cognition, while measures of how students plan, execute strategies, monitor and revise their errors, and evaluate their progress correlated with regulation of cognition. Schraw and Dennison (1994) also found the two components to be highly intercorrelated, suggesting that they work in unison.

While there is a general agreement among researchers that metacognition is chiefly comprised of knowledge and skills components, there is some disagreement on how to conceptualize specific components of metacognition (Veenman, Van Hout-Wolters, & Afflerbach, 2006). Several models of metacognition emphasize the various sub-processes of metacognition such as the monitoring and controlling of learning, and are cyclical in nature (Zimmerman, 2001). In particular, the monitoring and controlling processes are believed to mutually influence each other similar to how knowledge about cognition and regulation of cognition were considered linked by Schraw and Dennison (1994). The five-step cyclical model of metacognition developed by Ambrose et al. (2014), is one such example. The five steps in order are: assessing the task, evaluating strengths and weaknesses, planning, monitoring performance and applying strategies, and reflecting and adjusting. Separating metacognition into a multi-step model allows researchers to measure student metacognition in a nuanced and rigorous way, especially considering how students do not necessarily acquire equal mastery across all steps as they mature. An example of how this five-step model would be applied for a

high school world history student completing a poster assignment would go as follows. First, the student would read over any directions, consult any rubrics, and ask the teacher questions so that it is abundantly clear what is required to properly complete the poster assignment. Second, the student would reflect on any past experiences with similar assignments and become aware of any potential pitfalls to minimize or avoid, or any skills and talents to emphasize or rely on. For example, if the student excels at organizing information visually in an engaging and informative manner but does not like writing and does not work well under time pressure, then awareness of this can inform how the student may choose to best complete the poster assignment. Third, the student would combine the understanding of the assignment from the first step with the understanding of the self from the second step to develop a plan. For example, if the assignment asks for a fair bit of writing and analysis in addition to having compelling visual elements, then the student may recognize that the writing and analysis portion of the poster assignment may require additional time and attention than the visual elements and plan accordingly. Fourth, the student would monitor progress on the poster assignment and adjust strategies and plans as necessary. For example, if the student initially selects a topic for the poster assignment and researches it but then realizes there is too much information to include in the poster, then strategic decisions must be made to think about what to include and what to exclude from the poster. Fifth and finally, the student would check the completed assignment against what the requirements for the assignment is before submitting it for evaluation and make any changes as necessary. This final reflection can also be done by the student after the assignment has been completed or returned with feedback, and what the student learns from the process can then inform how the second step in the model will be applied in future assignments. Ambrose et al. (2010) placed motivational beliefs about learning and success as a central aspect to all the steps

in the model. All the steps in the model require students to be active and engaged in the learning process, which can require a belief about the learning process that they expect their efforts to be worthwhile. Demotivated students may not see the merits of employing the metacognitive process if they see all efforts as resulting in inevitable failure. In this way, Ambrose et al. (2010) sees motivation variables as a necessary complement to metacognition.

### **Motivation**

Like metacognition, motivation is also recognized as an integral part of many theories of learning, including self-regulated learning. In Schraw et al.'s (2006) model of self-regulated learning, motivation serves a key function of influencing the use and development of cognitive and metacognitive skills via beliefs and attitudes. As cognitive and metacognitive skills are important to learning, motivation can be thought to be one of the critical drivers of student learning by changing motivated students' beliefs and attitudes towards learning and further disposing them towards using more cognitive and metacognitive skills (Schraw et al., 2006).

**Motivation and academic performance.** As Schraw et al.'s (2006) conception of self-regulated learning show, motivation is often depicted in the context of working in conjunction with other influences to learning, but motivation itself has a context and framework in which it operates. Not all students are equally motivated, and understanding this context and framework helps explain individual differences. For example, students who are more likely to be motivated in their effort, perseverance, and behavior tend to be students who are more confident in their competence and have greater expectations of excellence than their peers (Bandura, 1997). Indeed, students may differ on how they perceive themselves and rate their own academic achievement and may choose a course of action depending on what they believe they are capable of and hope to achieve (Zimmerman, 2000).

**Motivation and feedback.** Motivation is closely related to feedback. In a review of the literature linking feedback with motivation, Crooks (2001) concluded that the biggest benefits to motivation from feedback come from a focus on three factors. First, student motivation benefits from feedback concentrating on the qualities of individual students' works and not from comparisons between students. Feedback in this way helps to avoid directing individuals towards an ego-orienting motivation. Ego-orienting or ego-involving motivation (the two terms will be used interchangeably) essentially centers individuals' attention on their own self-worth, external goals, and mastery for the sake of pursuing the latter two (Nicholls, 1983, 1984). Second, students will benefit most from feedback targeting specific ways in which students can improve their work. This aspect of effective feedback is very similar to the literature linking individualized feedback with improved academic performance (Clarke, 2005). Third, feedback is most motivational when it highlights improvements that students have made relative to their own earlier work(s). Crooks (2001) stressed the specific and improved (relative to a past individual performance) aspects of feedback as points of feedback often missed. Crooks (2001) asserts that feedback in this way helps to stimulate task-orientated motivation. Task-orientating or task involving motivation (the two terms will be used interchangeably) is characterized as individuals being concerned with improving mastery for the sake of performing a task better or building on prior performances. Motivation should be maintained for as long as individuals perceive a task to be important in developing and assessing their mastery on a task (Nicholls, 1983, 1984).

**Motivation and metacognition.** In a self-regulated learning framework, motivation, metacognition, and cognition are tightly connected (Butler & Winnie, 1995). In a review of the self-regulated learning literature, Paris and Paris (2001) found that motivation, metacognition, and cognition needed to work together for effective learning to take place in the classroom.

Moreover, Borkowski (1992) claims that motivation and metacognition are inextricably linked by two critical assumptions: all forms of cognition that are significant to learning have motivational consequences and these consequences affect future learning. For example, as students become more skilled at being strategic in their learning (applying metacognition) and learn better as a result, they come to recognize the value of strategy use in learning (they become more metacognitively aware).

**Key indicators of motivation.** Parallel to self-regulated learning, a general expectancy-value model of motivation has been adopted to conceptualize and study student motivation (cf. Eccles, 1983; Pintrich, 1988; Pintrich, 1989; Pintrich & de Groot, 1990). This model arose out of a need to examine how the three components of self-regulated learning are linked to individual differences in motivation, which in turn help understand how these differences relate to students' engagement and performance in the classroom. The model posits that there are three components to motivation alongside the three components of self-regulated learning: an expectancy component, a value component, and an affective component. The expectancy component is about students' beliefs about their abilities in performing a task; the value component is about how important or interesting students view a task in terms of their goals and beliefs; and the affective component is about how students emotionally react to a task (Pintrich & de Groot, 1990). The measure developed by Pintrich and de Groot (1990) from the general expectancy-value model of motivation is the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ measures key indicators of motivation including but not limited to scales of: self-efficacy, achievement values, test anxiety, intrinsic goal orientation, extrinsic goal orientation, and control of learning beliefs.

*Self-efficacy.* Among self-referential motivational variables, self-efficacy is considered the most ubiquitous and central influence of human behavior (Bandura, 1997). It is an individual's perception of their capacity to successfully complete tasks in a specific context (Bandura, 1999). In the academic context, students who have high self-efficacy are more likely to engage in learning activities, work harder, persist through difficulties, deploy effective learning strategies, and attain higher achievement (Schunk, 1994; Zimmerman & Martinez-Pons, 1990). Formative feedback that gives students a sense of their progress is tied to self-efficacy. Based on review of studies that manipulated various goals and progress feedback conditions, Schunk and Ertmer (2000) claim students who received learning goals and progress feedback had the highest levels of self-efficacy, motivated strategy uses, and achievement.

*Achievement values.* Achievement values are important variables in the expectancy-value theory. Adherents argue that how much individuals value an activity can influence their decision to take part in it, the extent to which they persist in the face of adversity, the enthusiasm in which they carry it out, and their performance on it (cf. Wigfield & Eccles, 2000). Based on a survey of studies on achievement values in students, Wigfield and Eccles (2000) surmised that students' ratings of how important they believed certain school subjects were and how much they liked them fluctuated through their middle school and high school years. The general trend was that elementary school students tended to value math more highly than high school students, and high school students tended to value English more. Wigfield and Eccles (2000) posited that the negative change in achievement values could be explained two-fold. Developmentally, older students may become more aware of and making use of the evaluative feedback they are receiving, such as grades, and engage in more peer comparisons. This is not surprising considering the ego-involving content of grades and the peer-comparisons they invite. Older

students may also find themselves being placed in school environments in which evaluations are increasingly salient and competition between students more likely. An example of this would be an increase in exams (and the associated grades), as well as performance metrics like GPA and class rank becoming important for future educational opportunities.

*Test anxiety.* In the academic context, test anxiety appears to be one of the most important emotional reactions students have in response to tasks (Wigfield & Eccles, 1989). Although test anxiety has been linked to the use of metacognition, cognitive strategies, and effort management, it has not shown as straightforward of a relationship to the associated self-regulated learning component as the other two (Pintrich & de Groot, 1990). In one study, students with high-anxiety were found to be just as effortful and persistent as low-anxiety students, but high-anxiety students were far less effective and efficient in their learning because they often failed to use appropriate cognitive strategies (Naveh-Benjamin, McKeachie, Lin, & Hollinger, 1981). Another study found that high-anxiety students were not as persistent as low-anxiety students and also avoided challenges (Hill & Wigfield, 1984). The research evidence makes clear that test anxiety can provide a powerful context of how performance is influenced by motivation.

*Intrinsic goal orientation and extrinsic goal orientation.* Ego-orienting and task-orienting motivation are closely related to extrinsic and intrinsic goal orientation, respectively. The difference between extrinsic goal orientation and intrinsic goal orientation rests on the students' reasons for doing a task (Pintrich & de Groot, 1990). Extrinsically motivated students tend to engage in learning activities for external reasons that are in sync with ego-orienting motivation (e.g., self-worth, peer comparisons, rewards, etc.), while intrinsically motivated students have reasons in line with task-orienting motivation (e.g., mastery, the enjoyment of the activity itself, etc.). Pintrich and de Groot (1990) note that students whose motivational orientation is to pursue



mastery and embrace challenge, and also find the task at hand to be of interest and value to them use more metacognition, cognitive strategies, and are better at managing their efforts.

Butler (1988) investigated the connection between feedback and task-oriented and ego-driven motivation in the effectiveness of comments versus grades as forms of academic feedback. Butler found that grades had the effect of shifting the motivational orientation of students, even those who started out with a task-oriented motivation, into an ego-oriented motivation. This effect held constant even with grades were supplemented with comments, which were meant to engender task-oriented motivation. Evidence of the switch to ego-oriented motivation was based on how students tended to recall the grade, rather than the comment when given both comments and grades.

There are practical implications intrinsic to the use of goal orientations. The danger of extrinsic goal orientation is illustrated in studies involving peer feedback in the classroom. Black, Harrison, Lee, and Williams (2007) observed that ego involvement led to students being afraid of looking ignorant in front of the teacher, which in turn led to less effective learning. Alternatively, intrinsic goal orientation can be developed in students through a gradual building of metacognitive skill. As suggested before, students may become more metacognitive in their learning as they become more familiar with its value (Borkowski, 1992). These students may continue to become even more sophisticated in their learning process, with some even beginning to realize that their motivation has changed from ego-oriented to task-oriented; that is, some students begin to enjoy learning for learning's sake and not because learning well distinguishes them from among their peers (Nicholls, 1989).

*Control of learning beliefs.* The level of control students perceive themselves to have over their learning can have a direct impact on even the most fundamental aspect of motivation

such as self-efficacy. If self-efficacy is the belief that students are capable (“I can do this!”), then control of learning beliefs is the belief students have about how much of that competence is within their own control (“It’s up to me to do it!”). Framed this way, it is possible for students high in self-efficacy to be low in their control of learning beliefs, if they believe that they are competent because they are born smart and look to blame factors beyond their control in the event of failure. Therefore, successful students high in control of learning beliefs experience a sense of agency in the sense that they see their own efforts and abilities as the cause behind their accomplishments and not necessarily a result of luck or the ease of the task (Borkowski, 1992).

Students who have a sense of agency over their learning may also eventually foster an “incremental” theory about the growth of their minds, in which they believe their intelligence is entirely malleable and that they are in control of their learning (Dweck, 1986). According to Dweck’s social cognitive theory, students can hold an entity theory of intelligence in addition to an incremental theory of intelligence (Dweck, 1999). Students who have an incremental theory of intelligence can be juxtaposed with students who have an entity theory of intelligence believe intellectual abilities are set from birth and cannot be changed. Students who endorse an entity theory of intelligence will most likely be low on control of learning beliefs, as they can easily attribute failures to who they are. The consequence of a belief in the fixed nature of abilities can be detrimental to students’ long-term academic success because it may lead them to avoid difficult but necessary challenges (Hong, Chiu, Lin, Wam, & Dweck, 1999).

### **Implications of Research**

Many researchers have looked at the effects of feedback on learning and academic performance. A meta-analysis by Hattie and Timperely (2007) showed there is considerable variability among these studies, including research on the use of praise and punishment, extrinsic

vs. intrinsic rewards, various mediums of feedback (e.g., written, video, audio, computer-assisted), etc. The diversity of these studies has helped to suggest that the effectiveness of comments-based feedback depends on factors that include if the feedback focused on students' understanding of learning material and information on bridging any gaps in knowledge that might exist.

Hattie and Timperely's (2007) metanalysis also revealed that the settings in which feedback studies were carried out varied, as many of them were not classroom-based. Studies on the effects of feedback on student metacognition have been conducted in similarly assorted contexts, such as the use of electronic feedback via "clickers" in traditional university lecture hall settings (Brady, Seli, & Rosenthal, 2013), and written electronic communication in massive open online courses (MOOC) (Thorpe, 2001). This study strives to supplement the literature by assessing the effects of a feedback intervention that is centrally integrated into a traditional high school class curriculum.

The connection between feedback and motivation has also been subject to serious study, and effective feedback has been linked with increasing motivation among students. However, few studies have looked at understanding the relationship between effective feedback, academic performance, metacognition, and motivation. The current study represented an effort towards building on the extant literature that connect feedback with learning, metacognition, and motivation, respectively, and explores if feedback can potentially be considered as a predictor for these important variables of student learning. Student perceptions vis-à-vis feedback in and of itself have also been researched in the past, and has also been folded into the model as another variable potentially predicted by feedback (see Figure 1).

## **Current Study**

The aim of the current study was to improve the academic performance of high school aged students in the 9<sup>th</sup> through 12<sup>th</sup> grade through a feedback intervention that was integrated into a world history curriculum. In the past, Butler (1988) found comments-only feedback led to superior learning compared to feedback involving grades only or grades and comments. The current study sought to replicate these findings in a live classroom environment by having an intervention consisting of two feedback combination: no grades and effective comments compared to a control condition of grades and minimal comments. The enhanced feedback central to the feedback intervention was modeled after Clarke's (2005) improvement prompts, with many students receiving scaffold prompts. The study was carried out in two classes of high school world history (i.e., one class was assigned the feedback intervention, while the other was assigned the control) over the course of a single learning unit which took about 4-5 weeks. Students received the feedback intervention or control throughout this time on their homework assignments. Students were assessed before and after the unit to see any effects of the feedback intervention on academic performance, metacognition, motivation, and their perceptions of the feedback they were receiving.

## **Hypotheses**

### **Academic performance.**

**H<sub>1</sub>:** Students who receive the feedback intervention will improve in their academic performance more than students who did not receive the feedback intervention, specifically, on an individual measure of achievement.

**Metacognition.**

**H<sub>2</sub>:** Students who receive the feedback intervention will increase in their metacognition more than students who did not receive the feedback intervention.

**Motivation.**

**H<sub>3</sub>:** Students who receive the feedback intervention will increase in their measures of self-efficacy and achievement values, and decrease in the measure of test anxiety more than students who did not receive the feedback intervention.

**H<sub>4</sub>:** Students who receive the feedback intervention will increase in their measures of intrinsic goal orientation and control of learning beliefs, and decrease in the measure of extrinsic goal orientation.

**Perceptions of Feedback.**

**H<sub>5</sub>:** Students who receive the feedback intervention will perceive the feedback they received differently by becoming clearer on the teacher's expectations and recognizing the opportunities for improvement afforded to them in the class. This change will not occur for students who did not receive the feedback intervention.

**Method****Participants**

The participants in this study consisted of 53 high school students (68% female) attending an inter-district magnet school in Hartford, Connecticut. The students were all enrolled in two sections of a world history class taught by the same teacher. The teacher and school administrators were briefed on the study and agreed to participate. The Institutional Review Board of Trinity College also reviewed and approved the study, confirming that all required ethical standards were met. Consent was obtained from all participating students via a letter sent

to their parents explaining the study's objectives, asking for written approval or disapproval regarding their child's participation (see Appendix A).

As the student body of the magnet school came from various surrounding school districts, the study sample was diverse. The majority of students self-identified as Hispanic (42%), Black (23%), or White (13%). All other students self-identified as Asian (6%) or as multi-racial/ethnic (17%). Many students (47%) listed Hartford as their hometown; the remainder listed 11 other towns in the Hartford-metropolitan area as their hometowns. Student hometown information was further categorized based on the District Reference Group (DRG), a classification system that groups Connecticut public school districts together according to SES indicators of the attending students. The DRGs are classified by letters A through I, with DRG A consisting of very affluent, low-need suburban districts and DRG I consisting of the state's urban districts that have high socioeconomic needs (Connecticut School Finance Project, 2016). Of these classifications, students in our study were from DRG group I (74%), DRG group G and H (15%), and DRG group C and D (11%). DRG group I includes the school districts of Hartford and New Britain; DRG group G and H includes the school districts of Bloomfield, East Hartford, Manchester, Middletown, and Vernon; DRG group C and D includes the school districts of Bolton, Portland, Wethersfield, West Hartford, and Windsor.

The participants were from two sections of a high school world history class taught by a single award-winning teacher who has been teaching in the middle school for many years, and had just started teaching high school for the first time at the start of the study. The classroom sizes were 27 for the Enhanced Feedback condition and 26 for the Standard Feedback condition. The high school classes included students of all grade levels. At the time of participation in the study, students ranged in age from 13 years and 11 months to 17 years and 10 months, with the

mean age being 15 years and 5 months. None of the preceding demographics (sex, race/ethnicity, hometown, and age) showed a significant difference between the feedback conditions; but grade level did. There were 29 ninth grade students in the study, of which 19 were in the Enhanced Feedback condition and 10 were in the Standard Feedback condition. There were 11 tenth grade students, of which one was in the Enhanced Feedback condition and 10 were in the Standard Feedback condition. There were 10 eleventh grade students, of which seven were in the Enhanced Feedback condition and three were in the Standard Feedback condition. There were three twelfth grade students, of which all were in the Standard Feedback condition. A chi-square test showed a strong association between grade level and condition,  $X^2(3 \text{ df}, N = 53) = 14.74, p = .002$ ; there were more tenth grade students than expected in the Standard Feedback condition and fewer tenth grade students than expected in the Enhanced Feedback condition.

Students in the Standard Feedback condition were recruited from the year-long version of the world history class, while students in the Enhanced Feedback condition were recruited from the semester-long version of the world history class. The recruitment of students from year-long and semester-long versions of the same class was unavoidable due to the teacher's schedule, and this decision was made to prioritize controlling for teacher confounds (having the same teacher teach both classes) over controlling for class format confounds (forcing a comparison of semester-long to semester-long class with different teachers).

The two classes were similar in many respects. The study was conducted during the WW II unit of the curriculum. Both classes were taught by the same teacher who assigned and gave feedback on identical assignments. The WW II unit ran from December 12, 2017 to January 12, 2018 (4.5 weeks) for the year-long class, and from January 30, 2018 to March 2, 2018 (4.5 weeks) for the semester-long class. The year-long class alternated between meeting twice a week

or three times a week and the semester-long class met daily. However, the two classes met for approximately the same class time, as the year-long group had a winter break from December 25, 2017 to January 1, 2018 and a small number of weather-related disruptions that canceled classes, while the semester-long class had far more weather-related disruptions that canceled class. Notably, the year-long group was taught the WW II unit in the middle of the overall curriculum, fully covering the WW I unit that preceded it. In comparison, the semester-long group received an abbreviated coverage of the WW I unit before started the WW II unit due to the time constraints of finishing data collection and analysis within the time frame allotted for this study.

While the content of the WW II unit, the assignments, and the teaching were identical, the grading structure of the classes were different for the year-long and semester-long classes, as they represented different feedback conditions. The year-long class or Standard Feedback condition was assigned grades for participation (counting for 10% towards the overall grade for the unit), homework (20%) and assessments (70%) including the unit test, poster project, and a debate. The semester-long class or Enhanced Feedback condition was not assigned any grades for participation or homework (each counting for 0% towards of the overall grade for the unit) and had assessments (counting for 100% of the overall grade for the unit) including the unit test, poster project, and a debate. Students in both feedback conditions therefore received grades, but the students in the Enhanced Feedback condition were not given the grades before measures were collected, meaning they were never given grades during the duration of the study.

## **Measures**

All measures were collected twice, once before the start the WW II unit and again after the end of the WW II unit, but before the students received their grades on their end-of-semester assessments. Measures were collected in the classroom with both the classroom teacher and



researcher present. The researcher followed up for all individual students who were absent during a testing session.

**Demographic information.** The demographic measures consisted of four items pertaining to the participant's date of birth, sex, race/ethnicity, and hometown (see Appendix B).

**Metacognition 5 (MC5).** The MC5 is a 35-question closed-ended self-report measure that was originally developed by Naratil, Howe, Reuman, and Anselmi (unpublished, 2012). The MC5 is based on Ambrose et al.'s (2010) five-step model of metacognition and has seven items corresponding to each step of the metacognition model. The response options were based on a five-point frequency scale ranging from "Never" to "Always" (see Appendix C). The teacher collaborating with the research study was consulted on the wording of the questions and responses to make them clear for high school students. MC5 scores were calculated for participants based on the average of all their responses on the questionnaire.

Cronbach's alpha was calculated at .918 at pre-intervention and .937 at post-intervention. Individual scales were also at similar levels of strong internal consistency. Items from Assess the Task had a Cronbach's alpha of .744 at pre-intervention and .873 at post-intervention. Items from Evaluate Strengths and Weaknesses had a Cronbach's alpha of .694 at pre-intervention and .746 at post-intervention. Items from Planning had a Cronbach's alpha of .623 at pre-intervention and .724 at post-intervention. Items from Apply Strategies and Monitor Performance had a Cronbach's alpha of .752 at pre-intervention and .761 at post-intervention. Items from Reflect and Adjust had a Cronbach's alpha of .795 at pre-intervention and .821 at post-intervention.

**Self-Efficacy.** The Self-Efficacy subscale is originally from Pintrich and de Groot's (1990) Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ measures various

aspects of student motivation, and self-efficacy is considered to be one of the variables under the category of Expectancy Components. Self-efficacy refers to students' perception of competence relative to their classmates and their grasp of the material itself; it therefore measures aspects of the students' expectations within the class. This subscale is comprised of nine items on a seven-point Likert scale that ranges from "Not at all true of me" to "Very true of me" (see Appendix D). Self-efficacy scores were calculated for each participant based on the average of their responses to the nine questions. The Self-Efficacy scale of the MSLQ had a Cronbach's alpha of .920 at pre-intervention and .941 at post-intervention.

**Achievement Values.** The Achievement Values subscale is another motivational variable that was assessed. The Achievement Values subscale is originally from Wigfield and Eccles (2000) who assessed students' perceived usefulness and interest in the subject of history. This subscale is comprised of five items on seven-point Likert scale (see Appendix E). Achievement Values scores were calculated for participants based on the average of their responses to the five questions. The Achievement Values subscale had a Cronbach's alpha of .907 at pre-intervention and .918 at post-intervention.

**Test Anxiety.** The Test Anxiety subscale is another motivational variable that was originally from the MSLQ under the category of Affective Components. The Test Anxiety subscale assessed the cognitive component of negative thoughts that could disrupt student performance and the emotionality component concerning the physiological experience of anxiety. This subscale is comprised of five items on a seven-point Likert scale that ranges from "Not at all true of me" to "Very true of me" (see Appendix F). Test Anxiety scores were calculated for each participant based on the average of their responses to the five questions. The

Test Anxiety subscale had a Cronbach's alpha of .807 at pre-intervention and .794 at post-intervention.

**Intrinsic Goal Orientation.** The Intrinsic Goal Orientation subscale is another motivational variable that was originally from the MSLQ under the category of Value Components. The Intrinsic Goal Orientation subscale assessed students' perceptions of the reasons why they participate in learning for class. It is an indication of whether students see learning as an end in itself, or as a means to an end, and is complemented by the Extrinsic Goal Orientation subscale. This subscale is comprised of four items on a seven-point Likert scale that ranges from "Not at all true of me" to "Very true of me" (see Appendix G). Intrinsic Goal Orientation scores were calculated for participants based on the average of their responses to the four questions. The Intrinsic Goal Orientation subscale had a Cronbach's alpha of .798 at pre-intervention and .876 at post-intervention.

**Extrinsic Goal Orientation.** The Extrinsic Goal Orientation subscale is another motivational variable that was originally from the MSLQ also under the category of Value Components. The Extrinsic Goal Orientation subscale assessed the degree to which students perceived the reasons for their participation in class to be motivated by external factors such as grades, rewards, competition, ego, etc. A high Extrinsic Goal Orientation score indicates that a student sees learning for class as a means to an external end. This subscale is comprised of four items on a seven-point Likert scale that ranges from "Not at all true of me" to "Very true of me" (see Appendix H). Extrinsic Goal Orientation scores were calculated for participants based on the average of their responses to the four questions. The Extrinsic Goal Orientation subscale had a Cronbach's alpha of .849 at pre-intervention and .895 at post-intervention.

**Control of Learning Beliefs.** The Control of Learning Beliefs subscale is the sixth and final motivational variable in this study, and was originally from the MSLQ under the category of Expectancy Components. The Control of Learning Beliefs subscale assessed the degree to which students believed that they were in control of their academic performance and that efforts to learn would result in positive outcomes. This subscale is comprised of four items on a seven-point Likert scale that ranges from “Not at all true of me” to “Very true of me” (see Appendix I). Control of Learning Beliefs scores were calculated for participants based on the average of their responses to the four questions. The Control of Learning Beliefs subscale had a Cronbach’s alpha of .676 at pre-intervention and .768 at post-intervention.

**Academic performance measures (Unit Test).** Students’ academic performance was measured via the WW II Unit Test (split into pre-test and post-test, respectively) that was developed by the teacher with input from the researcher (see Appendix J and Appendix K, respectively). It was a randomly ordered 25-question knowledge-based multiple-choice test covering the learning material from the World War II unit that was taught during the intervention. The design of the test provided an objective basis for assessing student academic performance that was unaffected by potential sources of subjectivity. Open-ended tests are by nature, graded subjectively even if evaluated by an experienced teacher. Moreover, the objectivity of the unit test addresses any potential expectancy effects that may have resulted from the teacher teaching students from both experimental conditions, thus knowing which students were expected to improve in their learning according to the study hypothesis. In both feedback conditions, the pre-test and post-tests were graded, but the results of the pre-test were not revealed to the students to prevent practice effects. All students regardless of feedback condition were notified of their post-test grades after the study had ended, as these grades were counted

towards their overall grade in the class. The WW II Unit Test had a test-retest reliability of .38,  $p < .01$  (correlation of test score at beginning of WW II unit with test score at end of WW II unit), pooled across both feedback conditions.

**Perceptions of Feedback (PoFB).** The Perceptions of Feedback scale was developed specifically for this study by the researcher. The Perceptions of Feedback scale assessed how useful students perceived the feedback they received. It is comprised of five items on a five-point frequency scale ranging from “Never” to “Always” (see Appendix L). Perceptions of Feedback scores were calculated for each participant based on the average of their responses to the five questions. The Perceptions of Feedback scale had a Cronbach’s alpha of .780 at pre-intervention and .896 at post-intervention.

## **Procedure**

**Feedback manipulation.** Feedback was manipulated for homework only. Standard Feedback was defined as no change to the grading strategies already in use by the teacher: a letter grade or a number grade, sometimes coupled with minimal written comments such as “Good work” or, “Explain more” (see Appendix M). Enhanced Feedback was defined as no grades and feedback following the guidelines the researcher co-developed with the teacher over the course of a few months (see Appendix N). The development process involved reviewing the feedback literature for useful ways to implement key findings regarding written comments that were effective for fostering learning. In particular, Clarke’s (2005) work formed a considerable basis on which the enhanced feedback for the study was designed. Guidelines for Enhanced Feedback were established before it was given to the students (see Appendix O), and the teacher practiced with the research team with work from a previous unit (WW I) in the same world history class she was teaching. Special care was taken to follow a 3:1 ratio of positive to negative

written feedback. Positive written feedback was defined as feedback that acknowledged requirements of the assignment that the student met or improvements relative to work in a previous assignment. Negative written feedback was defined as feedback that gave constructive criticism on aspects to improve for the student. These criticisms could broadly be categorized as either reminder prompts, scaffold prompts, or example prompts and the elaboration about how to improve in these prompts range from least elaborate to most elaborate in ascending order (Clarke, 2005). The ratio of positive to negative feedback was in line with Clarke's (2005) recommendations and the teacher also specifically recommended it as her professional opinion was that students needed initial positive acknowledgements of their work from a motivational standpoint.

In the Enhanced Feedback conditions, some students initially expressed concern that they would not be receiving grades on their homework during the course of the study. In response, the researcher consulted with the teacher and gave a joint presentation on the purpose of the study. Students were reassured that while they would not be receiving grades, but that they would be receiving a different kind of feedback that was designed to help them learn better over the long-term.

## **Results**

### **Correlations among Measures of Metacognition, Motivation, Feedback, and Academic Performance**

Correlations among measures of metacognition (MC5), motivation (Self-Efficacy, Achievement Values, Test Anxiety, Intrinsic Goal Orientation, Extrinsic Goal Orientation, and Control of Learning Beliefs), Perceptions of Feedback, and academic performance (Unit Test) were determined (see Table 1). At the onset of the feedback intervention, the MC5 correlated

positively with all motivational measures except for Test Anxiety and the Unit Test (range from .48 to .71). At the same time point, the Unit Test was correlated positively with only Achievement Values and Intrinsic Goal Orientation (.29 and .37, respectively). Perceptions of Feedback was correlated positively with metacognition and motivation, except not with Test Anxiety. At the end of the feedback intervention, the Unit Test was correlated positively with Self-Efficacy, Intrinsic Goal Orientation, and itself from pre-intervention (range from .31 to .44), and Perceptions of Feedback measured at post-intervention (.42). Perceptions of Feedback also stayed positively correlated with metacognition and motivation at post-intervention (range from .49 to .66), except not with Test Anxiety.

### **Effects of Feedback Condition and Time**

**Academic Performance.** A repeated-measures analysis of variance (ANOVA) showed a significant main effect of time,  $F(1,48) = 73.06, p < .001$ , partial  $\eta^2 = .604$ . As expected, students' performance on the Unit Test improved from the pre-test ( $M = 8.43, SE = 0.51$ ) to the post-test ( $M = 13.04, SE = 0.51$ ). Consistent with the prediction that Enhanced Feedback would improve student learning, feedback condition showed a significant interaction with time,  $F(1,48) = 8.95, p = .004$ , partial  $\eta^2 = .157$ . Students in the Enhanced Feedback condition showed significantly greater improvement on the Unit Test compared to students in the Standard Feedback condition (see Table 2 and Figure 2). There was no main effect of feedback condition; students in the Standard Feedback condition ( $M = 11.21, SE = 0.63$ ) did not differ overall from students in the Enhanced Feedback condition ( $M = 10.27, SE = 0.60$ ),  $F(1,48) = 1.17, p = .29$ , partial  $\eta^2 = .024$ .

**Motivation.** A repeated measures ANOVA showed a significant main effect of time on Extrinsic Goal Orientation,  $F(1,46) = 4.57, p = .04$ , partial  $\eta^2 = .090$ ; students' ratings of

Extrinsic Goal Orientation decreased from the pre-test ( $M = 5.18$ ,  $SE = 0.22$ ) to the post-test ( $M = 4.87$ ,  $SE = 0.22$ ). The interaction between feedback condition and time approached significance,  $F(1,46) = 3.61$ ,  $p = .064$ , partial  $\eta^2 = .073$ ; students in the Enhanced Feedback condition nearly showed greater decrease in their ratings of Extrinsic Goal Orientation compared to students in the Standard Feedback condition (see Table 3 and Figure 3). It is plausible that the withholding of grades in the Enhanced Feedback condition led students to decrease the importance they placed on grades. There was no main effect of feedback condition; students in the Standard Feedback condition ( $M = 4.99$ ,  $SE = 0.31$ ) did not differ overall from students in the Enhanced Feedback condition ( $M = 5.06$ ,  $SE = 0.29$ ),  $F(1,46) = 0.02$ ,  $p = .88$  partial  $\eta^2 = .000$ .

A repeated measures ANOVA showed a significant interaction of feedback condition and time on Control of Learning Beliefs,  $F(1,46) = 6.03$ ,  $p = .02$ , partial  $\eta^2 = .116$ ; whereas students did not differ in Control of Learning Beliefs at the beginning of the WW II unit, by the end of the unit, students in the Enhanced Feedback condition showed lower beliefs regarding control of their learning. Students are so accustomed to receiving grades, the withholding of grades during the WW II unit may have led students in the Enhanced Feedback condition to believe that they had less control over their learning in the classroom (see Table 4 and Figure 4). There was no main effect of feedback condition; students in the Standard Feedback condition ( $M = 4.99$ ,  $SE = .23$ ) did not differ overall from students in the Enhanced Feedback condition ( $M = 4.68$ ,  $SE = .21$ ),  $F(1,46) = 1.06$ ,  $p = .31$ , partial  $\eta^2 = .023$ . There was also no main effect of time; students in the Standard Feedback condition ( $M = 4.87$ ,  $SE = .16$ ) did not differ overall from students in the Enhanced Feedback condition ( $M = 4.81$ ,  $SE = .18$ ) across time,  $F(1,46) = 0.18$ ,  $p = .68$ , partial  $\eta^2 = .004$ .



**Perceptions of Feedback.** Contrary to prediction, a repeated measures ANOVA showed no interaction of feedback condition and time on Perceptions of Feedback,  $F(1,46) = 2.62, p = .11$ , partial  $\eta^2 = .054$  (see Table 5 and Figure 5). There was no main effect of feedback condition; students in the Standard Feedback condition ( $M = 3.81, SE = .15$ ) did not differ overall from students in the Enhanced Feedback condition ( $M = 3.63, SE = .14, F(1,46) = 0.78, p = .38$ , partial  $\eta^2 = .017$ ). There was also no main effect of time; students at the outset of the intervention ( $M = 3.73, SE = .11$ ) did not differ overall from students at the end of the intervention ( $M = 3.72, SE = .12, F(1,46) = 0.16, p = .90$ , partial  $\eta^2 = .000$ ).

### **Summary of All Other Repeated-measures ANOVAs**

Repeated measures ANOVAs were also performed for metacognition (MC5) and motivational measures (Self-Efficacy, Achievement Values, Test Anxiety, and Intrinsic Goal Orientation). For RM-ANOVAs for these measures, there were never significant effects of feedback condition, time, and interaction effects of feedback condition and time, with the exception of Test Anxiety, in which the condition main effect was marginally significant ( $p = .081$ ).

## **Discussion**

Past research and educational initiatives have shown strong evidence that comments-based feedback is an effective method of facilitating learning and motivation, and when implemented in schools as an intervention can improve academic performance (Crooks, 2001; Clarke, 2005). Consequently, over the past three decades, efforts have been made in places like England to shift how schools evaluate students by providing them with useful comments rather than simply traditional assessments such as grades (Clarke, 2005). While the literature around the academic and motivational benefits of comments-based feedback is robust, there are

comparatively few studies looking at the effects of comments-based feedback on metacognition, and even fewer investigating how feedback, metacognition, motivation, and academic performance fit together. Metacognition and motivation are well-established as key predictors of student success, and therefore understanding how they are affected by differences in feedback would provide a basis from which to understand their effectiveness. A goal of this study was to understand these connections by testing the effects of a feedback intervention in a high school world history class.

While tightly controlled studies are instructive in furthering our understanding of the complex learning process of students (e.g., Butler, 1988), it is also necessary to put the research findings into practice. Intervention-based studies like the current study, which use a real classroom curriculum present students with real stakes for high ecological validity. Such field studies also provide researchers with an opportunity to test aspects of feedback that cannot be easily reduced to a standardized formula, such as the notion that effective feedback is individualized. In this respect, this experiment sought to directly address the individual differences among the students via Enhanced Feedback with the aim of producing improvement for all students.

Field experiments also present unique challenges. While much of the focus of the study was on how the students were affected by the feedback intervention, it was also clear that in carrying out the experimental manipulation, the teacher was also forced to fundamentally rethink her thought process in assessing her students. Upon the conclusion of the intervention, the teacher gave an unprompted reflection concerning the change in her mindset as an educator. Before the beginning of the intervention, the teacher said she was felt she owed it to her students to give as much feedback as possible in the form of pointing out as many mistakes as possible.

Following the intervention, the teacher noted a shift in her mindset, now believing she is not doing justice to the hard work her students put in if she does not point out the positives in their work. She also expressed surprise at how quickly her thinking changed over the course of the 4.5-week intervention. While having the same teacher teach both intervention conditions was effective in controlling for potential variation between teachers, it was also vital to the design of the experiment to have the teacher teach the Standard Feedback condition first and use an objective evaluation method to gauge academic performance. It is difficult if not impossible to completely control for confounds of this type. Field studies like the current one allows researchers for testing in practice what is postulated in theory. Field studies can also reveal intriguing and unexpected consequences; teachers may be effected by an intervention in addition to their students and therefore change their pedagogy.

### **Academic Performance**

The results confirmed the hypothesis that while it was expected that all students would improve in their unit test scores as a function of general classroom learning, students who received Enhanced Feedback would show greater improvement in academic performance at the end of the intervention than students who received Standard Feedback. Worth noting, a close inspection of Figure 2, which shows the effects of feedback condition and time on the WW II Unit Test scores, appears to show that students from the Standard Feedback group appeared to have higher test scores on the pre-test than students from the Enhanced Feedback group. This initial difference probably resulted from the fact the two classes were randomly assigned to each condition, and it is unlikely that the groups would be exactly equal to begin with. Academic performance was measured by the unit test, which was an objective comprehension-based test. It

is reasonable to assume that the superior learning achieved by the students who received the feedback intervention was the result of them being provided Enhanced Feedback.

The study's findings of student improvement in academic performance as a result of Enhanced Feedback affirms previous research describing similar effects. It replicates the finding of Butler (1988) but extends her work to a classroom setting, addressing the question of ecological validity that Butler herself raised. Correspondingly, the explanation for the results may share a common thread: the lack of grades in the Enhanced Feedback may have moved students focus away from grades and helping them attend to the assignment at hand. It is plausible that this change in focus may have been especially beneficial for students who typically performed poorly, as low grades can affect the self-esteem of these students (Black et al., 2007; Craven, Marsh, & Debus, 1991). However, student performance in this study was assessed in aggregate and not separated on an individual basis or based on initial performance level. The absence of the typical ego-orienting information provided by grades may have provided a sense of stability to students' motivation in the Enhanced Feedback group, allowing them to focus on learning the material, leading to the higher rate of improvement in the final unit test. Another possibility to explain the greater learning gains made by the students who received Enhanced Feedback is that it was the result of the higher quality feedback, rather than the fact that they did not receive grades. In this interpretation, the presence or absence of grades may be secondary to giving students the information they need to making concrete adjustments in their understanding of the material they are learning. Yet another possibility to consider is that the grade and comments components of Enhanced Feedback may have had minimal or negligible direct effects on student learning and may have been mediated by increases in motivation that in turn led to greater gains in learning. While this explanation may seem unlikely since most of the

motivational measures did not show significant changes, especially in terms of an increase in self-efficacy, it is conceivable that the time duration of the intervention was too short for the students to become aware of changes in their motivation. If the relationship between Enhanced Feedback and academic performance is in fact mediated by increases in motivation, then perhaps a longer-term study would detect changes in student motivation as students' awareness catches up to their cognitive processes.

These contrasting explanations highlight a key aspect of the study design which complicates the interpretations of the important finding that students who received Enhanced Feedback experienced greater performance improvements on the unit test. The complication is that the Enhanced Feedback comprised two elements: grades and detailed feedback; both elements were not matched with controls. Ideally, the study would have been comprised of a group that received high quality comments and no grades (the Enhanced Feedback group in this study), a group that received high quality comments and grades (which was missing in this study), and a group that received standard quality comments and grades (the Standard Feedback group in this study). This was the case in the Butler (1988) study, but her design was not possible to replicate in the current study due to scheduling constraints. Although further research may be needed to disentangle the synergistic effects of the two aspects of Enhanced Feedback that were found in real classroom application, the present results help justify such efforts.

Since that Enhanced Feedback was based on Clarke's (2005) improvement prompts, it appears that modeling teacher feedback of providing a 3:1 ratio of positive to negative written feedback is effective for student learning. While overhauling the way evaluations are made can hardly be called a "simple tweak," especially considering the initial cost of time and effort in switching, the fact that keeping the curriculum as is and changing the evaluation schema still

yielded positive learning outcomes for students is promising. Considering Enhanced Feedback was provided multiple times over the course of a 4.5 week unit, this suggests that the feedback implemented may have been sufficient in addressing the gaps in students' knowledge from their lessons. Subsequent assignments may have helped students to consolidate the adjustments they made between assignments by confirming to them that the gaps in their knowledge have been addressed and close the feedback loop. Closing the feedback loop often involves a reciprocal adjustment by the teacher and the students, and the scores from the unit test at the end of the intervention suggest multiple feedback loops were completed successfully.

### **Metacognition**

While the study hypothesized students who received Enhanced Feedback would show higher levels of metacognition at the end of the intervention than students who received Standard Feedback, there were no effects of Enhanced Feedback on metacognition. Metacognition training was not part of the manipulation, but researchers such as Butler and Winne (1995) have theorized a close relationship with feedback as a means of seeking out and effectively utilizing external feedback. Accordingly, students with higher levels of metacognition would seek out feedback that specifically addresses gaps in their knowledge or confirms that their overall understanding is accurate. High-metacognition students would also be adept at taking greater advantage of the information contained in the Enhanced Feedback provided in this study, as the improvement prompts in the Enhanced Feedback cued students to specific areas of their assignments that displayed competence or needed growth. As such, the design of the current study allowed the researcher to observe if students exposed to Enhanced Feedback, which is more conducive to the use of metacognition than Standard Feedback, would result in a "spill-over" effect of students utilizing their existing metacognitive skills to make better use of the

Enhanced Feedback without any explicit instruction to do so. The results indicate simply creating the preconditions for effective metacognitive use was not enough to spontaneously stimulate it.

The finding that metacognition does not appear to increase even when students are given explicit feedback for how to improve their work may validate an assertion made by various researchers that metacognition cannot be taught effectively in the abstract but must be scaffolded directly onto course lessons and done so on a per subject basis (Hattie & Donoghue, 2016; National Research Council, 2005). Perkins (2014) suggests that when teaching metacognition, some teachers may have the expectation that it is enough to establish a general atmosphere that values and expects critical and creative thought. He pushes back against this assumption, saying that in reality, teaching students how to “learn to learn” requires explicit teaching strategies. While the current study contained elements to focus students’ attention on metacognition based on the type of feedback provided, the improvement prompts used in the Enhanced Feedback did not have any explicitly metacognitive elements in them. It is possible that the students who were most able to take advantage of the Enhanced Feedback and increase their metacognition were already high in metacognition, but that there were too few of them in the sample to show an overall effect.

Another possibility that may explain the lack of improvements in metacognition may be tied to the absence of a self-assessment component in the study. The process of self-assessment via reflective journaling was shown to increase metacognition by Siegesmund (2016) in an introductory college biology class. The study was run over the course of an entire semester and in addition to self-assessment, involved forming classroom-based learning communities to help facilitate open exchange of feedback among faculty and students. As the participants in Siegesmund (2016) study consisted primarily of first year first semester undergraduate students,

the relative closeness in age with the high school students in the current study may allow for some extrapolating to help interpret the findings of the current study. There are two primary implications of Siegesmund's (2016) work relevant to the current study. First, her research confirms the assertions of previous researchers (Hattie & Donoghue, 2016; National Research Council, 2005; Perkins, 2014) that metacognition needs to be tightly integrated into the curriculum. Second, Siegesmund (2016) shows that reflective journaling can be an effective way to target metacognition via self-assessment, but that the journaling must prompt students to reflect on specific aspects of the class such as what techniques they employed to prepare for an exam. Asking students to reflect on their learning in general is not enough. Overall, it appears that the current study had important elements conducive to metacognitive development (i.e., the Enhanced Feedback), but lacked the necessary structure (e.g., self-assessment, curriculum integration of a metacognitive intervention, reflective journaling, etc.) to have a significant impact on it. It appears that improving academic performance and metacognition can happen orthogonally, and that adding a more explicit self-reflection aspect would be important in future research that aims to improve both components of student success.

### **Motivation**

Of all the measures involved in the hypotheses about motivation, only the results for Control of Learning Beliefs were statistically significant, although the results for Extrinsic Goal Orientation were very close to conventional levels of significance. Only the Extrinsic Goal Orientation measure showed the expected trend consistent with the initial hypothesis that students who received Enhanced Feedback (no grades and helpful feedback) would deemphasize the importance of grades as they no longer received grades. As the achievement values and test



anxiety are comparatively less related to the feedback intervention, the lack of significant results for these measures will not be discussed further.

Compared to students who received Standard Feedback, students who received Enhanced Feedback showed greater decreases in extrinsic goal orientation, as well as greater decreases in control of learning beliefs. There were no significant effects of the intervention on self-efficacy, achievement values, test anxiety, and intrinsic goal orientation. This meant that the feedback intervention had very few effects on the motivation of the students, except that students receiving Enhanced Feedback believed grades were slightly less important but also believed they had less control over their own learning. While these two results may seem contradictory on the surface, they actually fit together to explain students' academic experiences in a traditional classroom environment.

The sense of stability provided by the Enhanced Feedback that may have been a factor in improved learning may also have inadvertently been a factor in the lack of change in student motivation. The Enhanced Feedback was composed of three-parts positive comments that acknowledged things the students did well on the assignment—but gave no indication of relative performance that compared students to their peers—as well as one-part improvement prompt. On balance, the feedback—being neither especially threatening (a low grade) or encouraging (a high grade)—may have had a relatively neutral effect on the ego-orientation of the students and by extension, their motivation. Since grades are a much more salient indicator of performance than positive and negative comments. It is worth emphasizing that this study only manipulated the feedback provided from the teacher to the students. Teacher feedback, most often in the form of grades, can have the power to directly affect the motivation of students (Butler, 1988; Craven et al., 1991). But there may be limits to this power. When looking strictly at the feedback

provided by teachers that is task-focused and “ego-neutral,” the type of feedback given to students in the Enhanced Feedback condition may not have been enough to motivate them. This may have especially been the case in the absence of familiar norms such as grades with which student could compare current performance with past performance. To fill the vacuum of grades, externally supplied and internally interpreted feedback may need to be more explicit in its positive or negative connotations for there to be an effect on specific aspects of student motivation. A critical component of generating motivation from feedback may lie in the active participation of the students (Chang, Fukuda, Durham, & Little, 2017).

**Self-efficacy.** Students who received Enhanced Feedback did not increase in self-efficacy more than students who received Standard Feedback as hypothesized. One of the key ideas identified in Black and Wiliam’s (1998) research was that self-efficacy is important to successful learning, and nurturing it depends not only on the teacher providing effective feedback, but also requires the active involvement of the students receiving such feedback. Schunk (1996) demonstrated that when students engaged in self-evaluation of their capabilities or what they have learned, they become aware of their progress in skills and learning, and this awareness boosts their self-efficacy and leads to further achievement. Schunk emphasized the importance of accurate self-evaluation, as students who make low self-evaluations of their progress could hinder their own motivation and learning, even if they are more effective in their learning than they realize. Schunk also proposed that the salience of self-evaluation was important in properly communicating to students the progress that they had made, while also acknowledging that the practice of self-evaluation can require training and may need to be practiced frequently (self-evaluation was performed daily in the study). The basic premise of Siegesmund’s (2016) study is echoed by the findings by Schunk (1996) in that together they suggest that self-reflection is

important in developing and consolidating skills such as metacognition and motivation that indirectly impact performance. Thus, the absence of an explicit self-evaluation component in the current study may have been the reason for a lack of effects on most of the motivational variables despite improvements in academic performance. Students in the current study who were given Enhanced Feedback received information that pointed out positives in their work. However, it is possible this may not have been communicated clearly enough, or that the students did not process these positives in a way that led them to believe they were making progress in their learning. Effects on self-efficacy may have been observed had students taken an active role in processing the feedback via self-evaluation, thereby recognizing their growth and closing the feedback loop.

Worth noting, it is also plausible that the duration in which the Enhanced Feedback was provided was not long enough to show an effect. Especially for some of the students who have historically performed poorly in traditional academic settings, the positive elements of the Enhanced Feedback needed to counteract years of negative feedback. Given the global nature of self-efficacy, the combination of the intervention only lasting 4.5 weeks and introducing what would have been perceived as an unconventional evaluation method may have been insufficient to shift students' self-efficacy.

**Intrinsic goal orientation.** In contrast with the hypothesis that Enhanced Feedback would increase intrinsic goal orientation of students more than students in the Standard Feedback condition, all students experienced no change. Perhaps the relatively short duration of the intervention (4.5 weeks) was insufficient to change students' internalized sense of themselves as learners. Another aspect of the intervention that may have contributed to students not changing their intrinsic goal orientation is the fact that the focus of the intervention was on teacher-

provided feedback. It is plausible that the teacher-provided comments in the Enhanced Feedback condition may have been interpreted by students as just another source of extrinsic motivation, rather than grades, thereby in the students' minds their incentives have not changed. Some students reported feeling motivated after having received positive comments recognizing their work on assignments, and in this sense the motivation would still be coming from external sources. To change students' intrinsic goal orientation may require a combination of a longer intervention and a self-evaluation component to help them internalize the feedback they have been provided so they may begin to see learning as a self-driven process.

**Extrinsic goal orientation.** The effect of the feedback intervention on extrinsic goal orientation approached significance and was in the predicted direction—students in the Enhanced Feedback condition decreased in extrinsic goal orientation more than students in the Standard Feedback condition. As the teacher-provided feedback is externally generated, when the teacher withholds grades students lose a familiar goal orientation. The change in the way students are evaluated in the Enhanced Feedback condition may have shifted their attention to the content of their work and focus more on quality learning. This in turn may have led to the decrease in extrinsic goal orientation and improved academic performance on the unit test. Also, it may be possible that students accepted this change in evaluation passively as they acknowledged the teacher as an authority figure or recognized that they had no choice in the matter. Students would thereby accept the withholding of grades and introduction of elaborate comments as “the new normal” and consequently shift their extrinsic goal orientation to adapt. It may be possible for academic performance to improve and extrinsic goal orientation to decrease in this manner, as three of the four measures of extrinsic goal orientation were explicitly concerned with grades, and their absence was very salient to students. The plausibility of such a

scenario in which students passively adjusted their goal orientation while failing to change on most other motivational variables is reasonable when considering that the lack of an active self-evaluation component in the study was surmised as a reason for why there were no effects on most of the other motivational measures. As previously mentioned, improving motivation in many instances may require more active engagement (Schunk, 1996).

**Control of learning beliefs.** Contrary to predictions, students in the Enhanced Feedback condition felt less in control of their learning than students in the Standard Feedback condition. Based on the results in which students did not increase in Self-Efficacy, Achievement Values, and Intrinsic Goal Orientation, and went down in Test Anxiety, it seems plausible they would not feel any more in control of their learning than they did before the intervention. Indeed, this relationship with the other measures may not be surprising as it should be noted that the Control of Learning Beliefs measure is a subscale of the MSLQ, in which it closely correlates with most of the other motivational measures collected in this study (Self-Efficacy, Achievement Values, Test Anxiety, Extrinsic Goal Orientation, and Intrinsic Goal Orientation); Control of Learning Beliefs has also correlated closely with other MSLQ measures in other studies (see Table 1; Credé & Phillips, 2011). The decrease in students' control of learning beliefs despite their improvements in academic performance may be explained by a combination of factors such as the notion that students may have felt a lack of agency in switching over to an unfamiliar evaluation system and the loss of the contextual information of grades.

One of the common concerns students expressed at the end of the study was that they felt by not having grades it was difficult for them to chart their current performance relative to previous attempts. This is understandable considering letter grades and numbers can give students a shorthand for their relative performance and is the method of evaluation with which

they were most familiar. While the peer comparison aspect of grades is often emphasized in studies regarding grades, it is also the case that grades provide a relative self-comparison, even if the information is limited. One goal of the improvement prompts utilized in the Enhanced Feedback condition was to include comments on students' progress relative to their previous performance(s) to help them have a sense of continuity and build a narrative of learning from assignment to assignment as grades may do in a relatively simple manner (e.g., "My grade went up, I must be doing better; my grade stayed the same, I must be doing the same; my grade went down, I must be doing worse."). There are a few possibilities for why the Enhanced Feedback did not ameliorate the absence of self-comparative information from grades. It may be possible that the Enhanced Feedback did not provide consistent feedback on students' progress, or that the teacher needed to be more explicit in her feedback so that students could understand how much they have learned. It may have been the case that Enhanced Feedback provided consistent and clearly worded feedback on progress, but students were unfamiliar in interpreting those comments. Also, the fact that the intervention was conducted in a single course meant that students presumably received grades in their other courses. The lack of consistency in evaluation criteria between the courses may have been a contributing factor in the lack of results in the current study. It is plausible that if the study lasted longer than 4.5 weeks, the longer duration would help overcome the initial novelty of the Enhanced Feedback and show effects for Control of Learning Beliefs and possibly for the other motivational variables as well.

### **Perceptions of Feedback**

The hypothesis that students who received the feedback intervention would have more positive perceptions of feedback than students in the control condition was not supported; there were no differences in perceptions of feedback. It is striking that there was a disconnect between

actual improvements in performance in the Enhanced Feedback condition and the students in that condition not perceiving their feedback to be any more helpful than those in the Standard Feedback condition. Perceptions of Feedback was an original measure of this study that asked students about understanding teacher expectations on assignments and meeting or exceeding them. It also asked if students were aware of revision opportunities on the assignment and if they used feedback for future improvement. While the unit test used to measure academic performance was designed to be an objective measure of learning, the Perceptions of Feedback measure was designed to gauge students' subjective awareness of the classroom learning environment and the types of feedback they were receiving. In the world history classes where the intervention took place, the teacher regularly provided revision opportunities for assignments. This means that there is an objective "answer" to the question asking students if there were revision opportunities, hence what the question is truly measuring is the students' awareness of the feedback process (opportunities for revision) built into the class. Although this was not the case, it was presumed that students who received Enhanced Feedback would become more aware of these opportunities and thereby score higher on the measure. A valuable part of applying formative assessment in the classroom is to understand what the students are aware of, so that the teacher can reflect on the feedback they assign and adjust according to student needs.

The fact that students still learned better with Enhanced Feedback despite not perceiving it to be better than Standard Feedback is related to how the same students in the Enhanced Feedback condition decreased in their control of learning beliefs. While the Enhanced Feedback was tailored to the current performance of individual students for each assignment, students may have been too inexperienced with interpreting their progress when compared to grades. For example, a "90" may indicate to students that they understand the teacher's expectations well,

while receiving an “80” after having previously received a “90” may indicate to students that they may no longer be clear on how to meet the teacher’s expectations. Furthermore, outside of independently revising completed assignments, students did not always receive subsequent assignments on which to consolidate the advice given by improvements prompts. Successive assignment may have called for different skills, or there may have been other aspects of the assignment that warranted feedback. These factors in conjunction may have led to students not perceiving feedback to be any more helpful than grades overall.

## **Conclusions**

In some senses, everyone is exposed to feedback on a daily basis, but effectively using the feedback is a learned skill with multiple layers. While the results show students were effective in using feedback in the cognitive sense—increasing their academic performance—it was not the case that the same students simultaneously utilized feedback to increase motivation or improve metacognition. An interesting consequence would be to at least superficially consider the feedback conceptualized in the current study as having cognitive, metacognitive, and motivational components, a structure parallel to Schraw et al.’s (2006) conceptualization of self-regulated learning. Within this framework, the cognitive component of feedback was measured by academic performance on the Unit Test, the metacognitive component was measured by metacognition measures of the MC5, and the motivational component was measured by variables adopted from the MSLQ (Self-Efficacy, Achievement Values, Test Anxiety, Intrinsic Goal Orientation, Extrinsic Goal Orientation, Control of Learning Beliefs). The results from the current study suggest that a given piece of feedback needs to explicitly and effectively incorporate each element to show effects. The improvement prompt that formed the crux of the Enhanced Feedback addressed the cognitive component of feedback and showed effects, but



there were no components in the feedback that gave explicit metacognitive training, hence there were no effects of feedback on metacognition. The motivational component of feedback may have also been lacking, which resulted in a mix of unexpected and insignificant results. A way to address these shortcomings may have been active student engagement with the feedback in the form of self-evaluation. Ideally, all three aspects of feedback would be sufficiently supported so that students will perform well on academic performance indicators directly related to the feedback they received (i.e., Unit Test), but also be able to generalize these skills to other areas of their life via metacognition and be motivated to do so.

### **Limitations and Future Research**

There are a few notable limitations to the current study that lay the groundwork for future research. One such limitation is that this study was limited to two high school world history classes. Future studies could include more world history classes, recruit classes in multiple subject areas, or even test department-wide or school-wide initiatives. As is the nature of field experiments, it may be more difficult to maintain a strictly experimental design at larger scales, but even quasi-experimental designs may prove to be informative in generalizing previous findings in the literature as the current study aimed to do. A feedback intervention that was conducted more broadly and beyond a single course would likely allow students to be immersed in the new type of feedback and may lead to even stronger results than in the current study. Being shown Enhanced Feedback in a variety of different courses and contexts would help students to understand that it is a general skill and not limited to certain school subjects. For example, Enhanced Feedback for Geometry may look quite different from that for English Composition. However, the mental thought process of embracing gaps in knowledge by being

alerted to them via Enhanced Feedback and bridging them by engaging with that feedback is a common experience that can link together the seemingly disparate feedback.

The current study included a diverse sample of students from many different racial and socioeconomic backgrounds but was not big. A larger the sample may enable researchers to further analyze the effects of feedback in students with high or low baselines in academic performance, motivation, and metacognition. Some important questions to consider are if Enhanced Feedback would benefit high achieving or lower achieving students more, and how best to adapt Enhanced Feedback to each students' idiosyncrasies. Some similarities among all students may be uncovered. Based on Butler's (1988) study, it would be reasonable to expect that both high achieving and low achieving students would benefit from Enhanced Feedback, particularly with respect to intrinsic motivation. Shifting the focus to learning over performance on tests and assignments would likely help students of all abilities maintain interest in their learning beyond the scope of each evaluation and lead to even greater gains in learning.

The time scale could also be extended in future studies from a single unit (4.5 weeks) as this study was limited to, to longer time frames such as over the course of a semester (approximately 15 weeks) or a school year. A longitudinal approach may also be appropriate if researchers have access to schools that are already engaged in formative assessment. Any of these study designs could help establish if there is a minimum duration in which a feedback intervention must last before proficiency can develop across the cognitive, metacognitive, and motivational components of feedback. As may be the case with expanding the scope of a feedback intervention with respect to incorporating more courses, a longer intervention would likely lead to more learning and students with higher levels of metacognition and motivation.

Future studies may also want to focus on how teachers are affected by feedback interventions and how their pedagogical perceptions and practices evolve as they are introduced to formative assessment; the challenge of mastering feedback as a skill extends to giving it as it does to taking it. In another piece of unprompted reflection, the teacher noted that it took much longer to evaluate papers with Enhanced Feedback than it did with Standard Feedback at the start of the intervention. According to the teacher, it took about 15 minutes to grade a “stack of papers” with Standard Feedback, while for Enhanced Feedback it took over an hour for the same stack. As the teacher improved over the course of the intervention, there was a learning process involved. The growth she experienced is evident in a previous reflection she made about how the study changed her thinking about how she evaluated her students. Future studies may want to consider the impact feedback interventions have on the teacher, as studies often focus on the effects of feedback on students as did the current study.

Should the three components of feedback be sufficiently addressed, then a feedback intervention that is cognitively, metacognitively, and motivationally enhanced may see improvements in all three aspects of student success and see improvements in student achievement that may be greater than the sum of its parts. After all, while it is natural to deconstruct aspects of student achievement into measurable variables, the success or failure of a student in the classroom is comprised of many different factors, of which not all important things are measurable and not all that can be measured are important. Future studies may also branch out beyond manipulating aspects of feedback and incorporate a full-blown metacognition intervention alongside a feedback intervention to see if there is a reciprocal positive influence on academic performance. If true, then such a study should see increases in student motivation and metacognition, and even greater improvements in academic performance. The feedback

intervention implemented in this study, along with the theories on which it was based on, may prove to be an important opportunity for improvement for educators.

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## Tables

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<u>Pre-Intervention</u>																		
1. MC5																		
2. Self-Efficacy	0.67																	
3. Values	0.52	0.66																
4. Anxiety	-0.09	0.00	0.06															
5. IGO	0.54	0.68	0.72	0.12														
6. EGO	0.48	0.40	0.14	0.32	0.24													
7. CLB	0.61	0.49	0.56	0.19	0.50	0.39												
8. PoFB	0.71	0.50	0.47	-0.13	0.40	0.41	0.41											
9. WWII Unit Test	0.07	0.26	0.29	-0.11	0.37	-0.22	0.18	0.04										
<u>Post-Intervention</u>																		
10. MC5	0.82	0.59	0.38	-0.05	0.40	0.40	0.52	0.64	0.07									
11. Self-Efficacy	0.70	0.83	0.59	-0.06	0.63	0.44	0.54	0.55	0.20	0.67								
12. Values	0.56	0.83	0.80	-0.09	0.63	0.19	0.48	0.52	0.24	0.56	0.70							
13. Anxiety	0.42	0.32	0.13	0.49	0.27	0.63	0.26	0.20	-0.26	0.34	0.28	0.28						
14. IGO	0.60	0.54	0.56	-0.04	0.48	0.48	0.51	0.40	-0.04	0.63	0.65	0.74	0.49					
15. EGO	0.67	0.49	0.31	0.11	0.31	0.78	0.39	0.54	-0.13	0.58	0.54	0.38	0.63	0.62				
16. CLB	0.69	0.56	0.47	-0.09	0.44	0.44	0.58	0.56	0.23	0.69	0.71	0.62	0.30	0.67	0.61			
17. PoFB	0.69	0.62	0.50	-0.16	0.38	0.50	0.50	0.74	0.19	0.55	0.66	0.49	0.14	0.48	0.58	0.65		
18. WWII Unit Test	0.18	0.44	0.18	0.04	0.31	0.16	0.18	0.18	0.38	-0.04	0.25	0.00	-0.06	-0.14	0.11	0.15	0.42	

Note: N's range from 46 to 53. For N = 50, critical values of r are .273 and .354 at  $\alpha = .05$  and  $\alpha = .01$ , respectively. MC5 = Metacognition 5; Values = Achievement Values; Anxiety = Test Anxiety; IGO = Intrinsic Goal Orientation; EGO = Extrinsic Goal Orientation; CLB = Control of Learning Beliefs; PoFB = Perceptions of Feedback.

Table 1. Correlations among Measures of Metacognition, Motivation, and Academic Performance Feedback

<u>Feedback Condition</u>	<u>n</u>	<u>Pre</u>		<u>Post</u>	
		<u><i>M</i></u>	<u><i>SE</i></u>	<u><i>M</i></u>	<u><i>SE</i></u>
Standard	24	9.71	0.74	12.71	0.74
Enhanced	26	7.15	0.71	13.38	0.71

*Table 2.* Effects of Feedback Condition and Time on WW II Unit Test Scores.

<u>Feedback Condition</u>	<u>n</u>	<u>Pre</u>		<u>Post</u>	
		<u><i>M</i></u>	<u><i>SE</i></u>	<u><i>M</i></u>	<u><i>SE</i></u>
Standard	22	5.01	0.32	4.98	0.33
Enhanced	26	5.35	0.30	4.77	0.31

*Table 3.* Effects of Feedback Condition and Time on Extrinsic Goal Orientation.

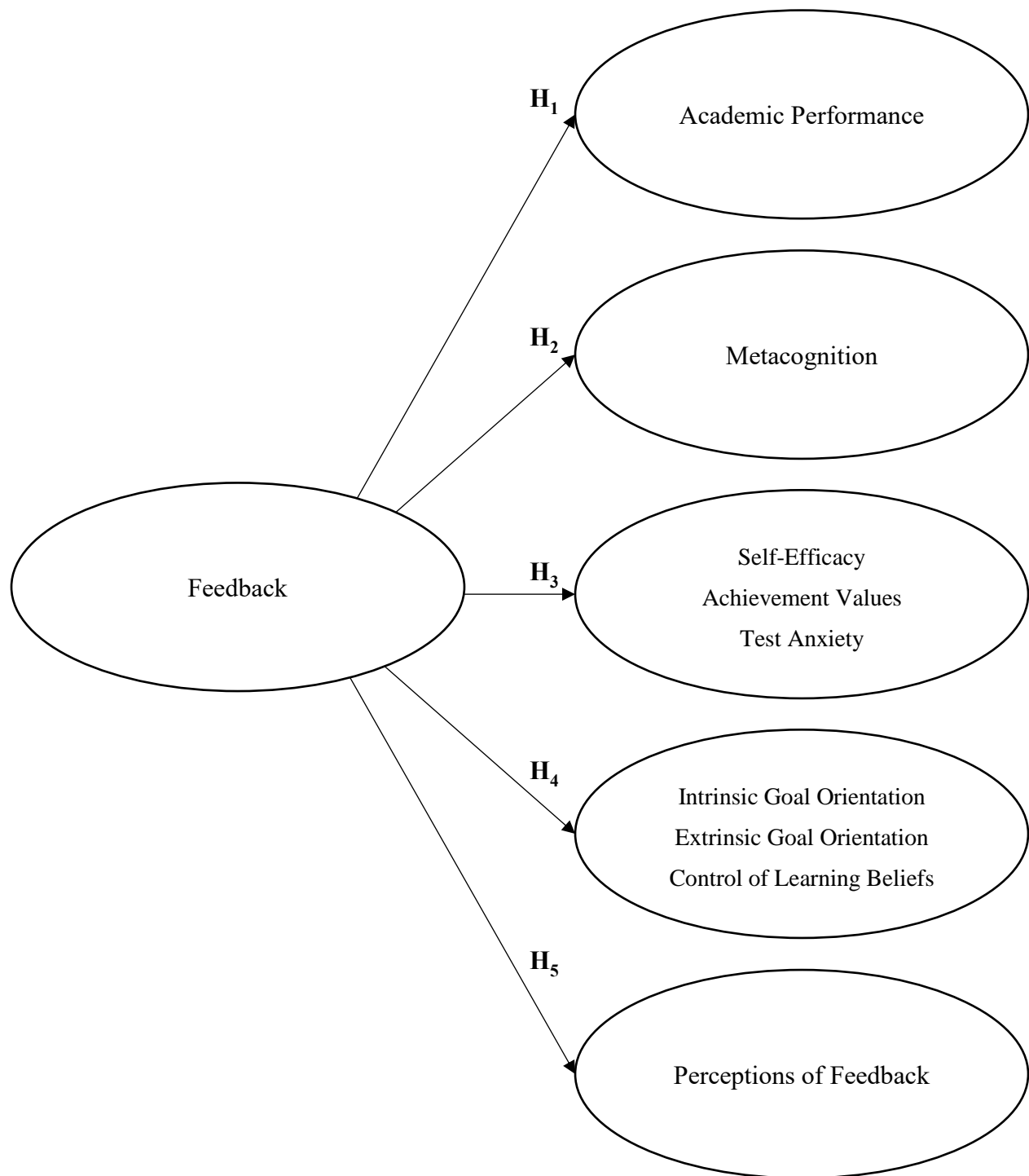
<u>Feedback Condition</u>	<u>n</u>	<u>Pre</u>		<u>Post</u>	
		<u><i>M</i></u>	<u><i>SE</i></u>	<u><i>M</i></u>	<u><i>SE</i></u>
Standard	22	4.84	0.24	5.15	0.26
Enhanced	26	4.89	0.22	4.46	0.24

*Table 4.* Effects of Feedback Condition and Time on Control of Learning Beliefs.

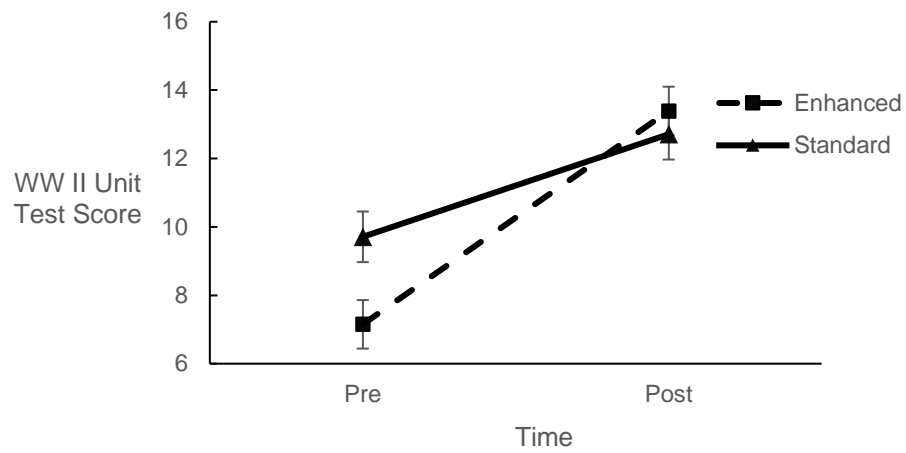
<u>Feedback Condition</u>	<u>n</u>	<u>Pre</u>		<u>Post</u>	
		<u><i>M</i></u>	<u><i>SE</i></u>	<u><i>M</i></u>	<u><i>SE</i></u>
Standard	22	3.76	0.16	3.87	0.17
Enhanced	26	3.70	0.14	3.56	0.16

*Table 5.* Effects of Feedback Condition and Time on Perceptions of Feedback.

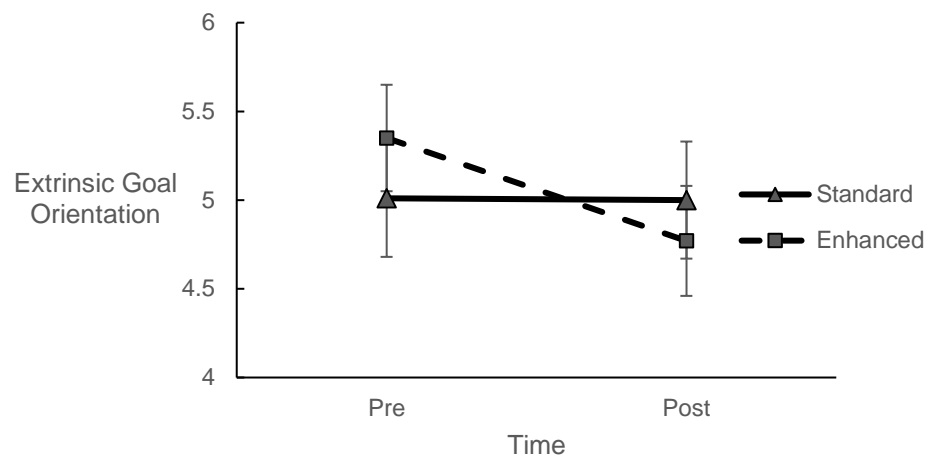


**Figures**

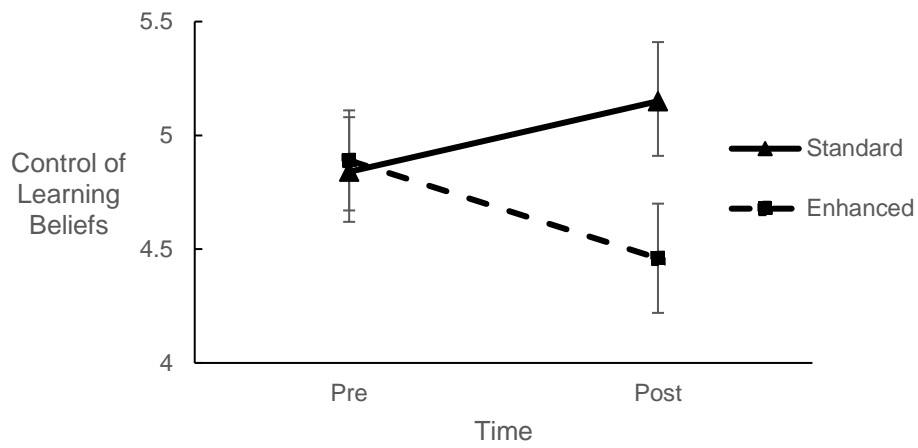
*Figure 1.* Feedback as a Predictor of Academic Performance, Metacognition, Motivation, and Perceptions of Feedback.



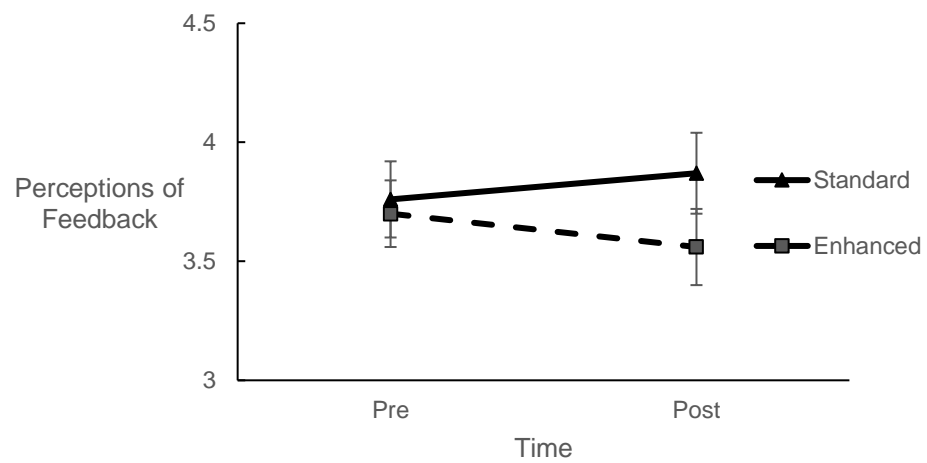
*Figure 2.* Effects of Feedback Condition and Time on WW II Unit Test Scores.



*Figure 3.* Effects of Feedback Condition and Time on Extrinsic Goal Orientation.



*Figure 4.* Effects of Feedback Condition and Time on Control of Learning Beliefs.



*Figure 5.* Effects of Feedback Condition and Time on Perceptions of Feedback.

## Appendices

### Appendix A



**HARTFORD MAGNET TRINITY COLLEGE ACADEMY**  
*at The Learning Corridor*  
 Sally A. Biggs, Principal



Dear Parent/Guardian,

As part of the Learning Corridor partnership and our relationship with Trinity College, we have been invited to participate in an ongoing research project. Students will be given feedback on assignments that may help improve academic achievement, motivation, and how students view their own learning. The study, *Feedback in High School World History*, is designed to measure students' motivational beliefs and ways in which students adapt their learning to feedback, which may lead to better study habits.

Students will answer questions about their learning styles and receive feedback on their class assignments designed to improve academic motivation. We do not anticipate the project to take any significant additional in-class time for the students. Trinity Professors Dina Anselmi and David Reuman will be overseeing the project. The feedback will be designed in collaboration between myself and a Trinity student. All feedback to the students will be provided directly by me.

If you have any questions or concerns regarding this exciting opportunity, please feel free to contact me (860-695-7355) and/or Mrs. Biggs (860-695-7201). We look forward to sharing our research results in the spring. Please sign this consent form indicating you have read this letter and agree to have your child participate in this study.

Sincerely,  
 Ms. Avery

Title of Project: *Feedback in High School World History*

Principal Investigators: Dina Anselmi, Ph.D. (860) 297-2236 or [Dina.Anselmi@trincoll.edu](mailto:Dina.Anselmi@trincoll.edu)  
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Deb Avery [AVERD001@hartfordschools.org](mailto:AVERD001@hartfordschools.org)  
 Hartford Magnet High School, Hartford, CT 06106

I acknowledge that I have received and read a letter explaining the *Feedback in High School World History* study. I understand that there are no known risks to participants in the study, that my child is free to withdraw from participation at any time, and that any questions that I may have about the study will be answered fully by the principal investigators.

- ☐ I grant permission for my son / daughter to participate.  
☐ I do not grant permission for my child to participate.

\_\_\_\_\_  
 Print Your Son's / Daughter's Name

\_\_\_\_\_  
 Print Your Name

\_\_\_\_\_  
 Your Son's / Daughter's Signature

\_\_\_\_\_  
 Your Signature

**Appendix B***Demographic Questions*

1. What is your birth date? (month/date/year)

---

2. What is your sex:

☐

FEMALE

☐

MALE

3. Which of the following groups best describes you?  
(You may check more than one group, if appropriate)

☐

ASIAN OR PACIFIC ISLANDER

☐

HISPANIC, REGARDLESS OF RACE

☐

BLACK / AFRICAN-AMERICAN, NOT OF HISPANIC ORIGIN

☐

WHITE / CAUCASIAN, NOT OF HISPANIC ORIGIN

☐

AMERICAN INDIAN OR ALASKAN NATIVE

4. In what city or town do you live?

---

5. What is your grade level?

---

6. What grade(s) did you receive in your most recent history class(es)?

---

**Appendix C***Metacognition 5 (MC5)*

---

**INSTRUCTIONS:** We are interested in what you, as a learner, do when you work on and prepare for assignments or tests as a part of your history class.

Please read the following sentences and choose the answer that relates to you and the way you are **based on your experiences from the past month in your world history class**. Please answer as honestly as possible.

---

7. When I am given an assignment in this class that asks me to remember a lot of information, I can tell what works best for me to remember everything.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

8. After completing a test or assignment in this class, I think about what went well.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

9. When I have a test coming up, I do most of my studying at the last minute.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

10. I read directions more than once before I start working on an assignment.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

11. I use skills – like taking notes, asking myself questions, and slowing down – when I read for this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

12. I know what my strengths are on the work I do in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS



13. After I get an assignment back, I try to figure out how I could improve my work for next time.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

14. When I start an assignment I check that I have all the things I will need – for example, a textbook, a computer, my notes, or the assignment itself – to complete the assignment.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

15. I do not understand the purpose of assignments in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

16. I review my writing for this class before I hand it into the teacher.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

17. I make an effort to examine my weaknesses on the work I do in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

18. I change my ways of completing an assignment when I realize that they are not working.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

19. When I work on a writing assignment, I immediately start writing without making an outline or a graphic organizer.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

20. I read directions carefully to make sure I understand all the different parts of an assignment.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

21. I ask my teacher for help.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

22. I can tell just how much time it will take me to complete assignments in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

23. When I get teacher comments or corrections in this class, I do not study any differently for the next assignment.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

24. When my homework requires specific materials, I remember to bring them home from school.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

25. I understand directions for assignments in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

26. When I read for this class I first focus on headings, bold words, and summaries and then read the material more carefully.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

27. Teacher comments or corrections I receive on assignments in this class are different from what I expect them to be.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

28. After completing a test or assignment in this class, I think about what did not work well.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

29. When I have an assignment that will be due more than a week in the future, I start working on it as soon as possible.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

30. I rush through directions to get started on a test as soon as possible.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

31. I compare my most recent teacher comments or corrections in this class to my earlier grades in order to see if I'm improving.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

32. I know what my weaknesses are on the work I do in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

33. When my teacher returns an assignment, I try to figure out what I didn't understand.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

34. When I have a writing assignment due, I do most of my work at the last minute.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

35. After I read an assignment, I make sure I know what the main goal of the assignment is.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

36. I use skills – like using flash cards, study guides, and working with a partner – when I prepare for a test.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

37. I make an effort to examine my strengths on the work I do in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

38. When I get teacher comments or corrections on an assignment in this class, I don't pay any attention to them.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

39. I make a “to do” list before I start working on an assignment in this class.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

40. When I have nearly finished an assignment, I read the directions one last time to make sure I have completed all parts of the assignment.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

41. I turn in tests for this class without checking my answers.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

---

**Appendix D***Self-Efficacy*

42. Compared with other students in this class I expect to do well in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

43. I'm certain I can understand the ideas taught in this course.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

44. I expect to do very well in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

45. I think I'm a good student in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

46. I am sure I can do an excellent job on the problems and tasks assigned for this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

46. I am sure I can do an excellent job on the problems and tasks assigned for this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

47. I think I will receive a good grade in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

48. My study skills are excellent in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

49. I think I know a great deal about the subject in this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

50. I know I will be able to learn the material for this class.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

---

**Appendix E***Achievement Values*

51. In general, how useful is what you learn in history?

1	2	3	4	5	6	7
NOT AT ALL						VERY
USEFUL						USEFUL

52. How useful do you think the history you are learning will be for what you want to do in the future?

1	2	3	4	5	6	7
NOT AT ALL						VERY
USEFUL						USEFUL

53. For me, being good at history is

1	2	3	4	5	6	7
NOT AT ALL						VERY
IMPORTANT						IMPORTANT

54. In general, I find working on history assignments

1	2	3	4	5	6	7
VERY						VERY
BORING						INTERESTING

55. Would you take more history classes if you didn't have to? (Check one answer.)

\_\_\_\_\_ 1) I very definitely would take more history.

\_\_\_\_\_ 2) I probably would take more history.

\_\_\_\_\_ 3) Maybe I would take more history.

\_\_\_\_\_ 4) I'm not sure.

\_\_\_\_\_ 5) Maybe, but not that likely.

\_\_\_\_\_ 6) I probably would not take any more history.

\_\_\_\_\_ 7) I very definitely would not take any more history.

**Appendix F***Test Anxiety*

---

**INSTRUCTIONS:** Below are statements about your everyday experience in your social studies teacher's classroom. Using the scale below, please indicate how untrue or true the statements apply to you.

Please answer according to what really reflects your experience from the past month in your world history class rather than what you think your experience should be. Please answer as honestly as possible.

---

56. When I take a test, I think about how poorly I am doing compared with other students.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

57. When I take a test I think about items on other parts of the test I can't answer.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

58. When I take tests I think of the consequences of failing.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME



59. I have an uneasy, upset feeling when I take a test.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

60. I feel my heart beating fast when I take a test.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

---

**Appendix G***Intrinsic Goal Orientation*

61. In a class like this, I prefer course material that really challenges me so I can learn new things.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

62. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

63. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

64. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.

1	2	3	4	5	6	7
NOT AT ALL						VERY TRUE
TRUE OF ME						OF ME

---

**Appendix H***Extrinsic Goal Orientation*

- 
65. Getting a good grade in this class is the most satisfying thing for me right now.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

66. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

67. If I can, I want to get better grades in this class than most of the other students.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

68. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

---

**Appendix I***Control of Learning Beliefs*

69. If I study in appropriate ways, then I will be able to learn the material in this course.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

70. It is my own fault if I don't learn the material in this course.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

71. If I try hard enough, then I will understand the course material.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

72. If I don't understand the course material, it is because I didn't try hard enough.

1	2	3	4	5	6	7
NOT AT ALL TRUE OF ME						VERY TRUE OF ME

---

**Appendix J***Unit Test (Pre)*

Name \_\_\_\_\_ Date \_\_\_\_\_ Block \_\_\_\_\_

## WWII Unit Test: Pre-Test

Directions: Write the correct letter for the answer on the line.

1

\_\_\_\_\_ During the first few months following American entry into World War II, (13)

- ☒ national opinion was sharply divided about the war.
- A)** ☐ national opinion was remarkably unified even though the war was going badly.
- B)** ☐ national opinion was initially divided but soon was unified by a string of
- C)** impressive victories.
- ☐ national opinion was ambivalent and fairly uninvolved due to the so-called phony
- D)** war.
- ☐ national opinion was strongly against the war.
- E)**

2

\_\_\_\_\_ On September 1, 1939 Germany invaded (1)

- ☐ Poland with a small number of soldiers and aircraft.
- A)** ☐ Poland with over a million men and a massive force of tanks and aircraft.
- B)** ☐ the Soviet Union with a blitzkrieg of forces.
- C)** ☐ Britain and France with a massive army.
- D)** ☐ United States and Japan with a divided military force.
- E)**

3

— The Japanese aggression during WWII started with (2)

- ☐ A) Imperialism and a desire to be a world power
- ☐ B) Nationalism and a desire to attack Germany
- ☐ C) Militarism and a desire to develop an atomic bomb.
- ☐ D) Alliances and their friendship with China.
- ☐ E) Trade agreements with the United States.

4

— The Science and Technology of WWII was (4)

- ☐ A) not as significant as World War I.
- ☐ B) has had a profound impact on our current lives and electronics.
- ☐ C) mostly in terms of food production and soldiers' rations.
- ☐ D) mostly about the development of the atomic bomb.
- ☐ E) was mostly only developed by the Germans.

5

— With reference to World War II, the term Holocaust refers to (3)

- ☐ A) Hitler's blitzkrieg against western Europe
- ☐ B) Hitler's campaign to provide Germans with more living space.
- ☐ C) the American nuclear destruction of Hiroshima and Nagasaki.
- ☐ D) the American effort to prevent Hitler's extermination of the Jews.
- ☐ E) Hitler's campaign to exterminate the Jews.

6

— 'The Fallen of WWII Project' illustrates (5)

- ☒ how deadly the War in Afghanistan is compared to WWII.
- A)** ☐ how small WWII was compared to WWI
- B)** ☐ how many women participated in WWII
- C)** ☐ how deadly WWII was for Russia compared to other countries
- D)** ☐ how many people died in the Holocaust
- E)** ☐

7

—— What is the trend of the size of the U.S. military from 1939 to 1945? (6)

- ☐ All of the branches of the military increased greatly
- A)** ☐ The Army and Navy increased greatly but the Marines decreased.
- B)** ☐ The U.S. military stayed about the same but the German Army increased
- C)** ☐ The U.S. military size was cut in half due to massive casualties
- D)** ☐ The U.S. military increased from 100,000 to 300,000.
- E)** ☐

8

—— The Isolationist Policy of the United States was designed to (8)

- ☐ Keep more Americans safe
- A)** ☐ Create more trade and boost the US economy
- B)** ☐ Prevent the U.S. from getting entangled in European problems
- C)** ☐ Help the United States focus on our own economic problems and challenges
- D)** ☐ All of the above
- E)** ☐

9

—— The German-Soviet pact, signed in August 1939 gave (1)

- ☐ Stalin control of land in eastern Poland
- A)** ☐

- ☐ Hitler control of land in the Soviet Union
- B)** ☐ Poland control of Germany.
- ☐ Poland control of the Soviet Union
- D)** ☐ Germans and Soviets control of Great Britain
- E)** ☐

10

— The famous image of "Rosie the Riveter" (3 & 13)

- ☐ symbolized the erosion of some of the prejudice against women working in
- A)** ☐ traditionally male jobs.
- ☐ symbolized a permanent change in the status of working mothers in the American
- B)** ☐ economy.
- ☐ symbolized the continued categorization of women in jobs deemed appropriate for
- C)** ☐ them by male bosses.
- ☐ showed how women's work was analogized to their traditional roles in the home.
- D)** ☐
- ☐ created permanent negative stereotypes of women in the workforce.
- E)** ☐

11

— Which area did NOT change lives of Americans during World War II? (7)

- ☐ Fashion and clothing
- A)** ☐
- ☐ Attack at Pearl Harbor
- B)** ☐
- ☐ TV and technology
- C)** ☐
- ☐ Penicillin and other medicines
- D)** ☐
- ☐ Cell phones and satellite images
- E)** ☐

12

— The objective of the Manhattan Project was to develop (14)

- ☐ the atomic bomb.
- A)** ☐



- ☐ synthetic rubber.
- B)** ☐ a system of coastal defenses.
- C)** ☐ a system for dispersion of civilian urban population.
- D)** ☐ relocation centers for Japanese Americans.
- E)** ☐

13

— Approximately how many African Americans participated in the military during WWII? (10)

- ☐ Less than 1,000 or 1%
- A)** ☐ More than White Americans
- B)** ☐ Almost a million
- C)** ☐ Close to 10 million
- D)** ☐ Only 100 as Tuskegee Airmen
- E)** ☐

14

- In the final months of World War II in Europe, American and British forces (15)
- ☐ A) pushed into the heart of Germany while Soviet troops bogged down in Poland.
  - ☐ B) entered Germany from the west and Soviet troops entered Germany from the east and occupied Berlin.
  - ☐ C) stalled along the Rhine River just outside Germany until they linked with Soviet forces.
  - ☐ D) rushed toward Berlin to gain a “knock-out punch” on Hitler before the Soviet troops could arrive in the capital city.
  - ☐ E) were unable to break into France through Normandy.

15

- Why were white American pilots not allowed to fly more than 52 missions but black American pilots often flew up to 100 missions? (11)
- ☐ A) Racism and discrimination
  - ☐ B) White pilots were considered incompetent
  - ☐ C) There were more black pilots than white pilots in WWII
  - ☐ D) The white pilots had less training
  - ☐ E) The white pilots refused to fly dangerous or risky missions

16

\_\_\_\_\_ Audie Murphy is a WWII hero because (12)

- ☐ A) He played a soldier in the movies about WWII
- ☐ B) He admitted to being scared before a battle.
- ☐ C) He protected his men while single handedly holding off a German attack.
- ☐ D) He stopped the Japanese advance in the central Pacific near Guam and Midway.
- ☐ E) He won the last major battle on the western front.

17

\_\_\_\_\_ In the weeks before the dropping of the atomic bombs, Japanese political and military leaders (14)

- ☐ A) were united in their determination to continue the war.
- ☐ B) were united in their decision to seek peace.
- ☐ C) were split with some wishing to seek peace and others wishing to continue the fight.
- ☐ D) offered to surrender if they could keep control of Okinawa and Korea.
- ☐ E) decided to surrender after Hitler died.

18

Germany attacked lands to the (1)

- ☐ North only; Denmark and Finland.
- A)**
- ☐ South only; Austria and Czechoslovakia
- B)**
- ☐ West only; France and Belgium
- C)**
- ☐ East only; Poland and Soviet Union
- D)**
- ☐ All directions
- E)**

19

One of the two locations on which the United States dropped atomic bombs were (2 & 14)

- ☐ Khe Sahn
- A)**
- ☐ Yokohama
- B)**
- ☐ Tokyo
- C)**
- ☐ Okinawa
- D)**
- ☐ Nagasaki
- E)**

20

\_\_\_\_\_ Why are some people offended by the 'Call of Duty: World War 2' video game? (9)

- ☐ A) The game used historians to appear more historically accurate
- ☐ B) The game uses hate symbols to appear more historically accurate
- ☐ C) The game is no real historical accuracy
- ☐ D) The multiplayer version is too realistic and causes PTSD.
- ☐ E) The game is too much fun and students are forgetting to study for their history test.

21

\_\_\_\_\_ When American soldiers returned home from the war, they found a nation that looked (13)

- ☐ A) largely the same as it did when they left.
- ☐ B) completely transformed by wartime rationing.
- ☐ C) completely transformed by the economic prosperity the war created.
- ☐ D) as different as the European and Asian nations they had left behind.
- ☐ E) completely transformed by anti-war sentiment.

22. \_\_\_\_\_ Women felt their lives would never be the same again after WWII because (13)

- A. Many worked outside the home.
- B. Many fought on the front lines of the war.
- C. Many had sons and daughters who were killed by the atomic bomb.
- D. Many had earned the right to vote.
- E. Many had traveled the world and didn't want to live in the US anymore.

23. \_\_\_\_\_ Video games might teach information about WWII if (9)
- A. more teenagers could be convinced to play them
  - B. they use the zombie mode
  - C. they use the multiplayer mode
  - D. they use the campaign mode
  - E. Veterans give permission
24. \_\_\_\_\_ The Japanese “Comfort stations” were about (13)
- A. servicing the wounded soldiers on the battlefield
  - B. honoring the tradition of military nurses in Japan.
  - C. widely publicized by the Japanese government
  - D. sex slaves and prostitutes provided to Japanese soldiers
  - E. providing blankets to POWs in Japanese interment camps.
25. \_\_\_\_\_ About how many women served in the American Army and Navy Nurse Corps in WWII? (13)
- A. 74,000
  - B. 7.4 million
  - C. Unknown because the military doesn’t keep good records
  - D. Unknown because the Army counted women and men in the same category
  - E. Unknown because the Allies counted all the women from different countries as one group.

**Appendix K***Unit Test (Post)*

Name \_\_\_\_\_ Date \_\_\_\_\_ WWII Unit \_\_\_\_\_

**Test: Post-Test****Directions: Write the correct letter for the best answer on the line.**

\_\_\_\_\_ 1. About how many women served in the American Army and Navy Nurse Corps in WWII?

- A. 74,000
- B. 7.4 million
- C. Unknown because the military doesn't keep good records
- D. Unknown because the Army counted women and men in the same category
- E. Unknown because the Allies counted all the women from different countries as one group.

\_\_\_\_\_ 2. On September 1, 1939 Germany invaded

- A. Poland with a small number of soldiers and aircraft
- B. Poland with over a million men and a massive force of tanks and aircraft.
- C. the Soviet Union with a blitzkrieg of forces.
- D. Britain and France with a massive army.
- E. United States and Japan with a divided military force.

\_\_\_\_\_ 3. The Japanese aggression during WWII started with

- A. Imperialism and a desire to be a world power
- B. Nationalism and a desire to attack Germany
- C. Militarism and a desire to develop an atomic bomb.
- D. Alliances and their friendship with China.
- E. Trade agreements with the United States.

- \_\_\_\_ 4. The Science and Technology of WWII was
- A. not as significant as World War I.
  - B. has had a profound impact on our current lives and electronics.
  - C. mostly in terms of food production and soldiers' rations.
  - D. mostly about the development of the atomic bomb.
  - E. was mostly only developed by the Germans.
- \_\_\_\_ 5. With reference to World War II, the term Holocaust refers to
- A. Hitler's blitzkrieg against western Europe
  - B. Hitler's campaign to provide Germans with more living space.
  - C. the American nuclear destruction of Hiroshima and Nagasaki.
  - D. the American effort to prevent Hitler's extermination of the Jews.
  - E. Hitler's campaign to exterminate the Jews.
- \_\_\_\_ 6. 'The Fallen of WWII Project' illustrates
- A. how deadly the War in Afghanistan is compared to WWII.
  - B. how small WWII was compared to WWI
  - C. how many women participated in WWII
  - D. how deadly WWII was for Russia compared to other countries
  - E. how many people died in the Holocaust
- \_\_\_\_ 7. What is the trend of the size of the U.S. military from 1939 to 1945?
- A. All of the branches of the military increased greatly
  - B. The Army and Navy increased greatly but the Marines decreased.
  - C. The U.S. military stayed about the same but the German Army increase
  - D. The U.S. military size was cut in half due to massive casualties
  - E. The U.S. military increased from 100,000 to 300,000.
- \_\_\_\_ 8. The Isolationist Policy of the United States was designed to
- A. Keep more Americans safe
  - B. Create more trade and boost the US economy
  - C. Prevent the U.S. from getting entangled in European problems
  - D. Help the United States focus on our own economic problems and challenges
  - E. All of the above



- \_\_\_\_ 9. The German-Soviet pact, signed in August 1939 gave
- A. Stalin control of land in eastern Poland
  - B. Hitler control of land in the Soviet Union
  - C. Poland control of Germany.
  - D. Poland control of the Soviet Union
  - E. Germans and Soviets control of Great Britain
- \_\_\_\_ 10. The famous image of "Rosie the Riveter"
- A. symbolized the erosion of some of the prejudice against women working in traditionally male jobs.
  - B. symbolized a permanent change in the status of working mothers in the American economy.
  - C. symbolized the continued categorization of women in jobs deemed appropriate for them by male bosses.
  - D. showed how women's work was analogized to their traditional roles in the home.
  - E. created permanent negative stereotypes of women in the workforce.
- \_\_\_\_ 11. Which area did NOT change lives of Americans during World War II?
- A. Fashion and clothing
  - B. Attack at Pearl Harbor
  - C. TV and technology
  - D. Penicillin and other medicines
  - E. Cell phones and satellite images
- \_\_\_\_ 12. The objective of the Manhattan Project was to develop
- A. the atomic bomb.
  - B. synthetic rubber.
  - C. a system of coastal defenses.
  - D. a system for dispersion of civilian urban population.
  - E. relocation centers for Japanese Americans.
- \_\_\_\_ 13. Approximately how many African Americans participated in the military during WWII?
- A. Less than 1,000 or 1%
  - B. More than White Americans
  - C. Almost a million
  - D. Close to 10 million
  - E. Only 100 as Tuskegee Airmen

- \_\_\_\_\_ 14. In the final months of World War II in Europe, American and British forces
- A. pushed into the heart of Germany while Soviet troops bogged down in Poland
  - B. entered Germany from the west and Soviet troops entered Germany from the east and occupied Berlin.
  - C. stalled along the Rhine River just outside Germany until they linked with Soviet forces.
  - D. rushed toward Berlin to gain a “knock-out punch” on Hitler before the Soviet troops could arrive in the capital city.
  - E. were unable to break into France through Normandy.
- \_\_\_\_\_ 15. Why were white American pilots not allowed to fly more than 52 missions but black American pilots often flew up to 100 missions?
- A. Racism and discrimination
  - B. White pilots were considered incompetent
  - C. There were more black pilots than white pilots in WWII
  - D. The white pilots had less training
  - E. The white pilots refused to fly dangerous or risky missions
- \_\_\_\_\_ 16. Audie Murphy is a WWII hero because
- A. He played a soldier in the movies about WWII
  - B. He admitted to being scared before a battle.
  - C. He protected his men while single handedly holding off a German attack.
  - D. He stopped the Japanese advance in the central Pacific near Guam and Midway.
  - E. He won the last major battle on the western front.
- \_\_\_\_\_ 17. In the weeks before the dropping of the atomic bombs, Japanese political and military leaders
- A. were united in their determination to continue the war.
  - B. were united in their decision to seek peace.
  - C. were split with some wishing to seek peace and others wishing to continue the fight.
  - D. offered to surrender if they could keep control of Okinawa and Korea.
  - E. decided to surrender after Hitler died.
- \_\_\_\_\_ 18. Germany attacked lands to the
- A. North only; Denmark and Finland.
  - B. South only; Austria and Czechoslovakia
  - C. West only; France and Belgium
  - D. East only; Poland and Soviet Union
  - E. All directions
- \_\_\_\_\_ 19. One of the two locations on which the United States dropped atomic bombs were

- A. Khe Sahn
- B. Yokohama
- C. Tokyo
- D. Okinawa
- E. Nagasaki

\_\_\_\_\_ 20. Why are some people offended by the 'Call of Duty: World War 2' video game?

- A. The game used historians to appear more historically accurate
- B. The game uses hate symbols to appear more historically accurate
- C. The game has no real historical accuracy
- D. The multiplayer version is too realistic and causes PTSD.
- E. The game is too much fun and students are forgetting to study for their history test.

\_\_\_\_\_ 21. When American soldiers returned home from the war, they found a nation that looked

- A. largely the same as it did when they left.
- B. completely transformed by wartime rationing.
- C. completely transformed by the economic prosperity the war created.
- D. as different as the European and Asian nations they had left behind.
- E. completely transformed by anti-war sentiment.

\_\_\_\_\_ 22. Women felt their lives would never be the same again after WWII because

- A. Many worked outside the home.
- B. Many fought on the front lines of the war.
- C. Many had sons and daughters who were killed by the atomic bomb.
- D. Many had earned the right to vote.
- E. Many had traveled the world and didn't want to live in the US anymore.

\_\_\_\_\_ 23. Video games might teach information about WWII if

- A. more teenagers could be convinced to play them
- B. they use the zombie mode
- C. they use the multiplayer mode
- D. they use the campaign mode
- E. Veterans give permission

\_\_\_\_\_ 24. The Japanese “Comfort stations” were about

- A. servicing the wounded soldiers on the battlefield
- B. honoring the tradition of military nurses in Japan.
- C. widely publicized by the Japanese government
- D. sex slaves and prostitutes provided to Japanese soldiers
- E. providing blankets to POWs in Japanese internment camps.

\_\_\_\_\_ 25. During the first few months following American entry into World War II

- A. national opinion was sharply divided about the war.
- B. national opinion was remarkably unified even though the war was going badly.
- C. national opinion was initially divided but soon was unified by a string of impressive victories.
- D. national opinion was ambivalent and fairly uninvolved due to the so-called phony war.
- E. national opinion was strongly against the war.

## Appendix L

*Perceptions of Feedback***SHORT ANSWERS: INSTRUCTIONS**

- Please answer every question based on your experiences from the past month in your world history class.
- Give lots of examples.
- There are no right or wrong answers, honesty is what matters!
- Please EXPLAIN your answers when asked to do so.
- These answers will not be graded.

**Please consider any grades, comments, corrections, advice, encouragement, etc. that you have received from Ms. Avery to be feedback.**

**Q1.** When you receive feedback on your assignments from Ms. Avery...

a) Are you frequently clear on what Ms. Avery expects on assignments?

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

b) Are you frequently clear on if your work matches what Ms. Avery expects?

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

c) Are you frequently clear on what you have to do to meet or exceed what Ms. Avery expects?

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

**Q2.** After you receive feedback from Ms. Avery, do you have opportunities to improve your work?

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

**Q3.** Do you use the feedback you receive from Ms. Avery to improve your work on your next assignment?

1	2	3	4	5
NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS

## Appendix M

## Standard Feedback

## Rocketry in Germany

- D+
- Glue the picture
- Add bullets of information

— Give the picture  
— Add bullets of information  
(D+)

In Germany they had a rocket team that ~~the~~ helped them make these ~~machines~~ machines of destruction like the V-1 or the buzzbomb that was an automatic aircraft ~~that~~ but we now call it the cruise missile and they also made a V-2 bomb where ~~it would go to space~~ called the ballistic bomb where it would be shot up in space then coming back to earth. ~~this was~~ both bombs were used ~~in~~ on London during 1944-45 killing thousands






## Appendix N


## Enhanced Feedback

**The Key To Victory During World War II** (1939-1945) *The Technology and Weaponry that influenced our future today.*

By: [Redacted]


Source: Mindell, David, "The Technology and Science of World War II," Published by the National Museum of World War II

**Germany**  **Automatic Aircraft and Ballistic Missile**

 During World War II, Nazi Germany had become extremely successful in their weaponry developments of the V-1 which is the automatic aircraft and the V-2 is the ballistic missile that launches into space and returns to its destination as the target. Both of these weapons made massive destruction during the war, and created by the "rocket team". After World War II, the weapons were given to the United States in Alabama, influencing the launches of the rockets for the U.S. to the moon and through space.

**Radar Technology**

The developments of radars allowed radio waves to navigate objects at only certain distances. This enables troops to trace their enemies if a surprise attack might occur and having the ability to automatically position weapons.


 This led to the advances in the navigation system for both ships and airplanes.


**Atomic Bomb Development**


The United States created a large group of expert scientists, engineers and industrial plants to build an area to develop the atomic bomb where the cities of Oak Ridge, Tennessee contributed 59,000 acres of land and Hanford, Washington giving 500,000 acres of land. These cities had workers mine uranium for the bomb in Tennessee and along the Columbia River in Washington the workers created plutonium. After the finishing of the building of both bombs, the United States released the uranium bomb on Hiroshima and the plutonium one on Nagasaki.


**Medical Advances**

The peak of the production of penicillin was a major event, treating several fatal diseases worldwide, along with refining blood transfusions.

 **Bomb**

 **Site Diagram**

 The bomb territory in the United States



## Appendix O

### *Enhanced Feedback Guideline*

## Foreword

I have gone over the Clarke and Black et al. literature to synthesize a general guideline for how to formulate enhanced feedback for our study. This is in no way meant to be comprehensive or authoritative on how feedback should be given, but represent my recommended guidelines. I will defer to your judgement for excellent pedagogy (But please do let me know where you diverge so I can write about it in my thesis!). I have organized it into sections for clarity, but I highly recommend you read it straight through at least once, as I reference and build upon previous sections.

Also note, when students initially receive their assignments back, they should be given in-class time to reflect on the feedback. However, this should only be done for the purposes of our experiment if it is already being actively done in the control group (i.e., it is already part of your “standard” pedagogy). For purposes of writing my thesis, please let me know if this is the case.

## 1. Focus the Feedback

Traditional feedback overemphasized the following. Try to stay away from these:

1. Presentation
2. Quantity
3. Surface features of any writing (especially spelling)



#### 4. Effort

Instead, focus feedback on how the student fared relative to the main goals of the assignment as stated in the directions for each assignment.

## 2. Close the Gap

The three conditions for effective feedback to take place are the following. Remember, there is a difference between a student being told what the standard is (as they would, if they read the directions for each assignment), and understanding it in their own terms.

- a. Possess a concept of the standard being aimed for
- b. Compare the actual (or current) level of performance with the standard
- c. Engage in appropriate action towards closing that gap

The role of enhanced feedback would be to assist students by *modelling* the thought process of working through these steps. The actual feedback does not need to follow this formula chronologically or explicitly. For example, consider the following: “Jason, you have provided clear illustrations and recognized pieces of technology that were innovative and important to the war effort in WW II. Can you give a general explanation of how the development of these technologies were the result of addressing certain problems during the war?” Here, the standard being aimed for may not be explicitly stated (although you may opt to do so). While there is a ‘snapshot’ of current performance, it is phrased in a way that brings the acknowledgment of positives before posing a challenge. There is no suggestion provided for how to close the gap (but you may focus your feedback on this aspect instead, especially if a student seems to be having a particularly difficult time on this step). A modified version of this feedback may look like the following: “Well done on

providing clear illustrations and identifying key WW II technologies. Go back to the notes of your reading to provide a stronger explanation of the history behind their development.”

Broadly speaking, there are three types of improvement prompts:

1. Reminder prompts
2. Scaffold prompts
3. Example prompts

Refer to p. 85-89 from Clarke (2005) on examples of each (especially p. 87). Generally speaking, the feedback will likely be scaffold prompts. Feedback can be ‘metacognitively enhanced’ in the sense that we are helping students “monitor progress and adjust strategies” or some other step in the MC5 model. I will likely code your feedback later for analysis, but in the meantime, it is more important that you give advice that you believe will be most beneficial for your students and we keep records of it!

### 3. Be specific

Give specific advice on what to improve (rather than simply correct) and how to do so. Avoid reiterating the learning goal(s). Feedback can only lead to improved learning if it contains advice on how to improve.

Specificity may also mean the feedback explicitly mentions what to do for ‘next time’ or for the ‘next assignment.’ Assignments of a similar type that are repeated throughout the unit provide an opportunity for students to show what they have learned from the feedback. This also means that feedback can be content-specific in that it clearly addresses how

students can improve on their current assignment, but also provides context of how making that improvement fits into the overall learning goal(s). To take the two examples from above about the WW II poster assignment, adding a sentence at the end like the following would be advisable: “Part of what makes a poster effective is that it doesn’t just give your audience some bits of trivia, but helps them understand how things are related to each other.”

It would also be important to note that we are targeting one, possibly two learning goals at a time for improvement (i.e., one to two improvement prompts per assignment). The focus for us is quality over quantity.