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# Learn 2 Learn: A Metacognition Intervention for Improving Academic Performance and Motivation on Middle School-Aged Students

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and Motivation on Middle School-Aged Students

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

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**Abstract**

The current study explored the effect of metacognition training on the academic performance of middle-school students. Intervention sessions for 6th and 8th graders were designed and implemented to enrich metacognitive skills, based on Ambrose et al.'s (2010) model of metacognition. Two classrooms of 6th and 8th graders received the *Learn 2 Learn* metacognition curriculum, while two other classrooms in both grade levels received the control curriculum on school transitions for either high school or college. Students' level of metacognition and motivation were measured with pre- and post- qualitative and quantitative assessments along with quarterly grades. Overall, results from the intervention showed the expected pattern of increase in students' metacognition, although it only approached statistical significance ($p = .11$). The 6th graders showed higher levels of metacognition, self-efficacy, and engagement than the 8th graders, and lower levels of anxiety. As expected, metacognition and motivation were positively correlated with academic performance. An additional pilot study was also conducted to explore measuring metacognitive use with an online assessment.

**Introduction**

**Self-Regulated Learning**

Self-regulated learning (SRL) stems from the social cognitive theory of self-regulation by Albert Bandura (Schraw, Crippen, & Hartley, 2006). Bandura (1991) argued that human behavior is influenced both by external outcomes (i.e., one's environment) and by self-regulatory processes stemming from one's ability to be self-reflective and self-reactive over thoughts, feelings, and actions. Effective learning behavior is no different. Self-regulated learning is the ability to assess, monitor, and control one's behaviors and affect within a learning environment (Schraw, Crippen, & Hartley, 2006; Paris & Paris, 2001).

SRL involves three main components: (1) cognition, (2) metacognition, and (3) motivation (Schraw, Crippen, & Hartley, 2006; Butler & Winne, 1995). Cognition refers to the ability to acquire and process information, including the ability to problem solve and think critically (Schraw, Crippen, & Hartley, 2006). Some cognitive strategies in learning involve rehearsal strategies that commit information to memory (e.g., copying, underlining, note-taking), elaboration strategies that elevate information processing (e.g., paraphrasing, summarizing), and various organizational strategies (Dignath & Buttner, 2008). Metacognition on the other hand, is the knowledge and regulation of one's cognitive skills (Schraw, Crippen, & Hartley, 2006). These strategies often involve planning, monitoring or checking for comprehension and performance, and evaluating the products and efficiency of learning (Dignath & Buttner, 2008). For example, having an awareness of one's sources of distractions that impede optimal learning, or rather block cognitive processing, and planning accordingly is a metacognitive skill.

The final main component of SRL is motivation towards learning.  As with many studies on self-regulated learning, Paris & Paris (2001) argues that SRL is the "fusing of skill and will"

(p. 91) within a learning environment; however, how the "will" to learn is measured has often varied among different studies. Schraw, Crippen, & Hartley (2006) define motivation in SRL as beliefs about self-efficacy which is how confident one is about their ability to perform a task, as well as epistemological beliefs which refers to beliefs about how intelligence is formed. Dignath & Buttner (2008) add interest and affective reactions to oneself and the learning task into the equation, while Pintrich & De Groot (1990) include perceived intrinsic value of the task and test anxiety as well as self-efficacy beliefs to measure motivation. Regardless of how motivation is defined, research has shown that students' motivation to learn is implicated in self-regulated learning (Schraw, Crippen, & Hartley, 2006; Dignath & Buttner, 2008; Pintrich & De Groot, 1990).

There are two theories regarding how students become self-regulated. One theory proposes that self-regulated learning is a set of behaviors that develop over time (Paris & Paris, 2001). Learners become self-regulated by "advancing through four levels of development: observational, imitative, self-controlled, and self-regulated levels" (Schraw, Crippen, & Hartley, 2006, p. 233). Another theory, the transmission model, postulates that self-regulated learning is a teachable skill (Paris & Paris, 2001). Intervention studies operate under the assumption that self-regulated learning can be taught. Paris, Cross, and Lipson (1984) for example, taught fifth grade students self-regulated learning strategies, particularly metacognitive strategies, and tested their effects on reading strategies. They found that SRL can be effectively promoted through classroom instruction. A meta-analysis by Hattie, Biggs, and Purdie (1996), found similar results based on 51 intervention studies.

Because of the advantageous effects of self-regulation on learning behavior, SRL has been found to be linked with increased academic performance at varying levels of education. Pintrich & De Groot (1990) conducted one of the principal studies investigating this relationship. Using a correlational design, it examined the relationship between self-regulated learning, including motivational orientation, and academic performance using students' grades, in-class seatwork/homework, quizzes/tests, and essays. They compared seventh grade students' academic performance with students' self-assessments of their own learning behaviors using the Motivated Strategies of Learning Questionnaire (MSLQ) to examine student's self-regulatory learning behaviors, as well as motivational factors, specifically self-efficacy, intrinsic value, and test anxiety; they found that SRL is directly implicated with performance, but that motivation alone was not sufficient to predict said performance.

Another intervention study conducted by Bail, Zhang, and Tachiyama (2008) examined the effects of classroom instructed self-regulatory learning behavior on academic performance and rate of graduation. Using undergraduate students, they taught students self-regulated learning and measured students' GPAs both after the intervention and over a longer time period. They found that teaching students self-regulated learning resulted in higher cumulative GPAs and better odds of graduation than for those who did not receive the intervention. Even amongst younger students in primary and secondary school, another meta-analysis by Dignath & Buttner (2008) revealed that SRL interventions are beneficial to students' academic performance and are effective methods to foster life-long learning.

**Metacognition**

The instruction of cognitive skills, like note-taking, annotating, summarizing, problem solving, etc. is often embedded in every day classroom activity; however, what is often not

taught in the classroom is the metacognition aspect of self-regulated learning. Broadly speaking, metacognition is thinking about thinking. It is the awareness and regulation of one's thoughts and learning style in order to become a self-regulated learner (Ambrose, Bridges, Lovett, DiPietro, & Norman, 2010). Metacognition is particularly important because "it enables individuals to monitor their current knowledge and skill levels, plan and allocate limited learning resources with optimal efficiency, and evaluate their current learning state" (Schraw, Crippen, & Hartley, 2006, p. 6). According to the theory of self-regulation proposed by Bandura (1991), without the ability to be self-reflective and self-reactive, or rather *metacognitive*, human behavior would be highly susceptible to frequently changing external influences. The ability to plan, monitor, and evaluate helps learners work towards specific goals that are self-directed and consequently, self-motivated. Moreover, metacognition functions to support cognition. Exercising metacognitive skills can enhance cognitive skills such as oral communication, oral persuasion, oral comprehension, reading comprehension, writing, language acquisition, attention, memory (Flavell, 1979).

Expanding on the metacognitive intervention conducted by Paris and colleagues (1984), researchers found that students who had received a metacognitive intervention had larger gains in reading comprehension compared to those who did not. Similarly, a more recent study with eighth-grade students in physics classes found similar results (Zepeda, Richey, & Nokes-Malach, 2015). After a six-hour intervention teaching students the skills to plan, monitor, and evaluate, researchers found that students who went through the intervention showed an increase in their metacognitive awareness as well as their understanding of Newtonian physics.

Based on the positive findings of these studies on academic performance and metacognition, Ambrose, Bridges, DiPietro, Lovett, and Norman (2010) developed a model of metacognition that describes the process of metacognitive thinking. Ambrose and colleagues (2010) propose a five-step cyclic model that includes the following steps:

1. *Assessing the task*, which involves understanding the assignment that a student is given;

2. *Identifying strengths and weaknesses* regarding the given task;

3. *Planning* towards the completion of the task;

4. *Applying various strategies and monitoring one's progress* along the way; and

5. *Reflecting and adjusting* when necessary

As with theories on self-regulated learning, central to the Ambrose et al. (2010) model of metacognition is the students' motivation and beliefs about learning. According Ambrose et al (2010), motivation is particularly important to this model because students who have negative beliefs about their own abilities may feel "feel defeated from the outset and consequently not bother to plan or implement effortful strategies because of the belief that any time and effort expended will do little good" (pp.201). The relationship between metacognition and motivation are not only positively correlated, they necessitate one another.

**Motivational Factors of Learning**

Zepeda, et al (2015) focusing on motivational factors and demonstrated that metacognitive-based interventions also improved students' motivation about learning, demonstrating the relationships amongst the different components of self-regulated learning. Motivation appears to improve students' metacognition. Pintrich & De Groot (1990), for example, found that students who scored high in measures of self-efficacy and intrinsic value

towards their classes had higher levels of metacognition and self-regulation. Thus, motivation

and metacognition have a reciprocal relationship.

While this relationship is largely supported by numerous research findings (Zimmerman,

1995; Paris & Paris, 2001), the problem with motivation research in metacognition or self-

regulated learning studies is that there has been no consensus over which aspects of motivation

affect and are affected by SRL. Schraw, et al. (2006) defined motivation as self-efficacy and

epistemological beliefs. Their review of SRL studies found that increasing self-efficacy through

modeling and feedback, as well as enhancing epistemological awareness through collaborative

environments promoting social equity supported the development of self-regulated learning

among science students.  In comparison, Wigfield & Eccles (2000) focused on achievement

values as key aspects of motivation, which refers to students' reasoning about their persistence

on learning tasks, measured as their perceived usefulness of the material they are currently

learning. Whether students see subject material as useful or of interest is related to other aspects

of their motivation including students' level of engagement and emotional disposition relating to

the class material.

**Classroom Engagement, Positive Emotions, and Motivation**

One motivational variable that has yet to be systematically explored in SRL and

metacognition studies is student engagement. While self-regulated learning has most often been

thought of as a positive reinforcement, or approach behaviors to learning, the process of self-

regulation may also include avoidance behaviors (Paris & Paris, 2001). These avoidance

behaviors include self-handicapping strategies that stem from a motivation to minimize threats to

self-esteem. Just as highly motivated students can self-regulated to avoid distractions, poorly

motivated students can self-regulate to avoid hard work (Paris & Paris, 2001). Therefore,

approach types of motivation are equally as important to instill in students to promote metacognitive behaviors. Convincing students to approach instead of avoid learning begins with increasing their engagement and interest in learning.

Monem (2010) conducted a literature review of past and recent studies concerning metacognition, interest, and engagement within the writing process. She found that students who experienced an emotional connection, that is, students who express interest in a task, were better able to monitor their use of metacognitive skills during the writing process. Interested students were more willing to engage in the writing process using specific metacognitive skills such as planning, evaluation through information synthesis, and reflection through drafting and editing.

Emotions are important factors for learning and academic achievement, and recently educational psychologists have added emotion and motivation as part of the cognitive dimensions of learning (Paris & Paris, 2001). Emotions are implicated in one's affective, cognitive, psychological, and behavioral processes. Mega, Ronconi, and De Beni (2014) conducted a study with undergraduate students to investigate the correlation between emotions, self-regulated learning, motivation, and academic achievement. Their assessment of emotions included both positive and negative emotions pertaining to oneself, to academic achievement, and to study time. Unsurprisingly, they found that emotions influenced students' ability to self-regulate their learning as well as their motivation, which in turn affected their academic achievement – positive emotions affected SRL and achievement positively and vice versa.

While Monem (2010) and Mega, et al. (2014) focused on the emotional aspect of engagement through student interest, there is also a behavioral aspect that is also important to consider (Skinner & Zimmer-Gembeck, 2009; Lee, 2014). Emotional engagement refers to students' affective reactions, such as interest, towards the subject learning environment, as well

as having a sense of belonging in the school and classroom (Lee, 2014). Indicators of emotional

engagement include enthusiasm, interest, enjoyment, satisfaction, pride, and vitality (Skinner &

Zimmer-Gembeck, 2009). On the other hand, behavioral engagement refers to students' positive

conduct in school and in the classroom, degree of involvement in learning, as well as

participation in classroom or school-related activities (Lee, 2014). Some indicators of a

behaviorally engage students include initiation, effort, persistence, intensity, attention,

absorption, and involvement (Skinner & Zimmer-Gembeck, 2009).

Lee (2014) examined the relationship of students' emotional and behavioral engagement

within schools on their academic performance. Using self-report questionnaires, she looked

specifically at how students' sense of belonging in the school affected their efforts and

perseverance in learning and found that behavioral engagement acted as a mediator between

emotional engagement and academic performance. Students who had high levels of emotional

engagement also reported higher levels of behavioral engagement compared to those with low

emotional connection with their learning environment. Thus, students were more likely to make

an effort (i.e., a behavior) when they felt a sense of connection (i.e., emotion) to their school

environment. She further found that students' levels of engagement a positively related to

academic performance; students who reported being more engaged scored higher in academic

tests of literacy, mathematics, and science skills.

Skinner, Kindermann, Connell, and Welborn (2009) conducted a study on engagement

with students in the third through sixth grade. Unlike Lee (2014), they looked at *classroom*

engagement as opposed to school engagement. They used an emotional and behavioral

engagement measurement called Engagement versus Disaffection Questionnaire developed by

Wellborn (1991), which focused specifically on academic activities in the classroom. Like Lee

(2010), they found that student emotional engagement contributed significantly to their behavioral engagement. However, behavioral engagement was not necessarily predictive of emotional engagement. Overall, students who were more engaged in the classroom were more successful academically.

While the relationship between engagement and academic performance has been studied, very little research has been conducted on how engagement affects metacognition. Based on the positive correlation between engagement and academic performance, it can be assumed that engagement is one necessary component of motivation that is implicated in self-regulated learning and metacognition. Metacognition might in fact be the missing link connecting the process of engaged learning behavior on increased academic performance.

**Disaffection, Anxiety, and Metacognition**

The other side of engagement is disaffection. Disaffection signifies the "absence of engagement" and refers to "behaviors and emotions that reflect maladaptive motivational states" (Skinner E. A., Kindermann, Connell, & Wellborn, 2009, p. 767). If engagement is associated with positive learning outcomes, then disaffection is related to negative outcomes. Students who are emotionally and behaviorally disconnected from the classroom learning environment and their school work tend to exert little effort and persistence, leading to less self-regulated learning (Skinner, et al. 2009).

In a study on the relationship between self-systems and engagement, Skinner, Furrer, Marchand, and Kindermann (2009) found that a predictor for emotional disaffection was low autonomy. Students who felt externally or internally pressured were more likely to be emotionally disaffected from their learning experience, and thus more likely to withdraw their behavioral engagement in the classroom. Moreover, they also found that students' perceived

level of competence relating to the classroom material is a primary predictor of feelings of anxiety in the classroom. Using self-report measurements, the researchers tested students both at the beginning of the school year and towards the end. They found that students who began the year having low self-efficacy and feelings of competence became more behaviorally disaffected and experienced elevated levels of anxiety by the end of the school year.

The relationship between anxiety and metacognition is particularly important and has been the focus on studies by several researchers (Pintrich & De Groot, 1990; Veenman, Van Hout-Wolters, & Afferbach, 2006). Research has shown that metacognition and self-regulated learning become blocked due to task difficulty and lack of motivation which are evident through students' levels test anxiety (Veenman, Van Hout-Wolters, & Afferbach, 2006). Using the MSLQ, Pintrich & De Groot (1990) found that amongst all affective reactions, test anxiety was negatively correlated with self-regulation. Veenman and colleagues (2007) theorized that test anxiety may result from production deficiency due to worrying thoughts interfering with students' performance, from past experiences with failure due to deficiencies with metacognitive skills, or from a combination of both. In any case, research on the effects of test anxiety supports the need for metacognitive instruction.

**Metacognitive-Based Interventions**

Due to the positive effects that metacognition has on academic performance, teaching metacognitive skills to students should be a be a priority amongst educators. However, this is simply not the case in most schools. Compared to cognitive skills, such as memorization or annotation, which tend to be hard and tangible skills, metacognitive skills are not explicitly promoted in the classroom. These skills are likely "outside the content area of most courses, and consequently they are often neglected in instruction" (Ambrose, Bridges, Lovett, DiPietro, &

Norman, 2010, p. 191). Metacognitive skills are useful in nearly all areas of study, and in an education system that compartmentalizes learning into distinct and separate subjects, this may be one reason why these skills are not given an appropriate focus. Whereas a student may be explicitly taught to underline points of a text in English class, or learn mnemonics as memorization tricks in History class, the instruction of skills like planning, monitoring, and evaluating often go under the radar due to their more conceptual natures.

Moreover, because metacognitive skills are more implicit skills than cognitive ones, they are much more difficult to teach without proper awareness of their existence in learning behavior. For example, Dignath & Buttner (2008) found that metacognitive trainings taught by researchers as opposed to traditional classroom teachers are more effectively simply because researchers are more explicit in their instructions and more aware of what encompasses metacognition. Many students and teachers are unconscious about the importance of practicing planning, monitoring, and reflecting on learning tasks, which is why many high school students struggle in their transition to college courses where intellectual demands are higher and personal responsibility on one's learning is greater (Ambrose, et al., 2010).

The speculations that there is a general lack of metacognitive instruction in schools was supported by Davis and Neitzal (2011). After interviewing and observing two middle schools, they found that teachers generally do not encourage SRL in the classrooms. Based on their observations, middle school teachers largely took control of assessing students' and classroom performance, while students were rarely prompted to ask questions regarding their own performance. Additionally, there were very few instances where students had the opportunity to engage in self-assessment of their own learning process (Davis & Neitzel, 2011). Even in college courses, metacognitive instruction is often neglected. Howard, Serviss, and Rodrigue (2010)

after analyzing the research writing skills of sophomore undergraduates, found that one-hundred percent of the papers they analyzed did not include incidences of summarizing, while over three-quarters of all the papers included direct copying. This suggests that students even at the college level are generally not well-versed in the use of metacognition, since the ability to summarize is one example of a students' ability to check their understanding of the text.

Despite the general lack of instruction on metacognition in the school system, studies have shown that these skills can be taught and have positive effects on students learning (Paris & Paris, 2001; Zepeda, Richey, & Nokes-Malach, 2015; Hattie, Biggs, & Purdie, 1996; Dignath & Buttner, 2008). In fact, the effects of research-based metacognitive interventions have largely been successful. A meta-analysis conducted by Hattie, Biggs, and Purdie (1996) revealed that metacognitive-based instruction and intervention, led to students experiencing higher motivation and increased academic performance. The most successful studies incorporated group-related activities and conditional knowledge of when, where, why, and how to use particular metacognitive tactics and strategies. Dignath and Buttner (2008) conducted a more recent meta-analysis of SRL studies involving metacognitive interventions in several primary and secondary schools. Similar to Hattie et al (1996), they found a significant effect size for metacognitive training. Furthermore, they found that interventions that incorporated metacognition, motivation, as well as some cognitive training resulted in the highest increase of academic performance, as well as emotional affect. As previously mentioned, explicit instruction in metacognition taught by researchers produced greater effect sizes, as opposed to trainings provided by classroom instructors.

Based on these studies, there appears to be three important characteristics needed for effective metacognitive-based interventions: (1) they must be embedded in the content matter,

(2) the instructor must inform learners of the usefulness of metacognitive activities, and (3) the

intervention must be of a long enough duration, so that students can practice and maintain the

application of their metacognitive skills (Veenman, Van Hout-Wolters, & Afferbach, 2006).

This suggests that it is important to embed metacognition in daily classroom activities in

order to promote practice in these skills and to keep form students' learning habits. Additionally,

teaching metacognition in regular classroom settings allows students to apply the metacognitive

skills they have been taught to their schoolwork. When explicitly taught about the usefulness of

metacognition, students may become more aware of the possible benefits of these strategies, and

may expect to see gains in their academic performance. If students see greater improvements in

their schoolwork as a result of practicing metacognition, it is assumed that they will be more

motivated to continue using these skills even after the trainings are completed.

Overall, designing activities that involve metacognition not only supports cognitive goals

and strategies, it also vastly improves metacognitive knowledge by adding to it (Flavell, 1979). If

done effectively, metacognitive interventions and SRL training can foster lifelong learning.

**Self-Assessments of Metacognition and Motivation**

One of the most cost-effective ways of measuring metacognition and motivation among

large sample sizes is using self-report assessments. These assessments ask participants to reflect

on their usual learning behaviors and use of metacognition. Due to this need for self-reflection,

self-assessments are inherently metacognitive in nature (Paris & Paris, 2001); however, given

that there is a lack of instruction and awareness of metacognition, this does raise the question of

the accuracy of self-report assessments. Participants may not accurately report the frequency

which they use metacognition with these measures because they are not actually aware of these

strategies in the first place. Despite these concerns, there are several measures of metacognition

that have been developed that have relatively high internal reliability, suggesting that participants are consistently reporting the same strategies at similar rates. These self-report assessments include the Motivated Strategies of Learning Questionnaire (MSLQ), the Metacognitive Awareness Inventory (MAI), and the Metacognition-5 (MC5).

One of the most widely used assessments of self-regulated learning is the Motivated Strategies of Learning Questionnaire developed by Pintrich (1991). The MSLQ includes questions about students' learning strategies, including cognitive and metacognitive strategies, as well as various motivation questions. Amongst these motivation scales are measures of self-efficacy for learning performance and a scale of text anxiety as a measure of average affective state. The MSLQ has been commonly used in studies exploring the relationship between motivation and metacognition (Pintrich & De Groot, 1990; Zepeda, Richey, & Nokes-Malach, 2015).  An additional motivational assessment developed by Wigfield and Eccles (2000) was used to assess students' achievement values. Achievement values measure students' perceived usefulness, importance, and interest on a specific learning subject. Wigfield and Eccles (2000) found that this motivational variable is predictive of performance in specific subjects. The more useful students find a subject, the more likely they are to perform well on the subject.

Another commonly used measurement of metacognition is the 52-item Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994). Unlike the MSLQ, the MAI focuses primarily on metacognition, focusing specifically on two components: (1) knowledge and (2) regulation of cognition. Since the original questionnaire was geared towards adults, Sperling, Howard, Miller, and Murphy (2002) developed a Jr. MAI version which measures the same broad categories of metacognition in children. The Jr. MAI was designed specifically to use with students in grades 3 through 9.

While the current study's participants are within the same age group as in Sperling et al. (2002), the model after which the Jr. MAI was constructed did not directly link up with the present study's interventions. Howe, Naratil, Reuman, and Anselmi (unpublished, 2012) developed the Quantitative Metacognition-5 (MC5) which specifically assessed the 5-steps involved in the Ambrose et al. (2010) model of metacognition to accurately measure students' gains within an intervention that was designed to follow the model. The quantitative version consists of 35 self-report items on a five-point likert scale, evenly distributed in the areas of planning, assessing strengths and weaknesses, planning, monitoring and applying strategies, and reflecting and adjusting.

A qualitative version (Qualitative MC5) based on the same model was developed thereafter by Godfrey, Lopez, Shimmel, Anselmi, and Reuman (unpublished, 2014). The Qualitative MC5 includes 8 open-ended questions about students' use of metacognitive skills. These questions were explicitly phrased for middle-school aged students. The coding criteria for the Qualitative MC5 were based on coding developed by Van Kraayenoord & Paris (1997), and students' responses were scored on a scale ranging from 0 to 3 using the following criteria for evidence of metacognition:

0 – student did not assess the dimension or feature addressed by the question; gave no response; gave an inappropriate response

1 – partial explanation or superficial analysis, not sufficient to demonstrate metacognitive processes

2 – relevant/reasonable complete response

3 – complete response with elaboration or a demonstration of multiple strategies

Godfrey and Lopez (2014) conducted a follow-up intervention study with the same design, and found that students Qualitative and Quantiative MC5 scores increased as a result of the intervention.

To measure student classroom engagement, Wellborn (1991) developed the Engagement versus Disaffection with Learning questionnaire, or EvsD. The EvsD is a 20-item questionnaire that assesses both the emotional as well as the behavioral aspects of student engagement in the classroom. The questionnaire was divided into four subscales: emotional engagement, emotional disaffection, behavioral engagement, and behavioral disaffection.  A study by Skinner and colleagues (2009) found a positive relationship between engagement measured using this assessment and academic performance. The Wellborn (1991) version was designed for late primary to secondary school-aged students. A college version of the assessment was created by Chi, Skinner, and Kindermann (2010) which included questions about college students' behavioral engagement and disaffection in-class, out-of-class, and above and beyond. The college version also divided emotional disaffection into smaller subscales measuring boredom, worry, and amotivation (Chi, Skinner, & Kindermann, 2010). While no studies have been published using the college version of the EvsD questionnaire, it is important to further explore the role of disaffection and worry/anxiety on metacognition and academic performance.

**Online Measures of Metacognition**

In contrast to self-report measures, another way used to measure metacognition is through online assessments. An online assessment is a method of obtaining data during a specific task performance, as opposed to offline assessments like self-reports, which are presented to participants either before or after the task performance.

Veenman, Van Hout-Wolters, and Afflerbach (2006) speculated that responses to self-report questionnaires do not always correspond to actual behavior during task performance. What is being exhibited in offline self-report assessments is not metacognitive *use*, but rather metacognitive knowledge or awareness. That is, students may know that it is important to plan for a project to do well, but the extent to which they plan may not be concordant with their self-reported use of planning. One student may plan by writing down the task in a planner, while another student may plan by creating a step-by-step outline of how to complete the task. Without proper metacognitive training as is frequent in typical classrooms, both students will report that they plan but the extent to which they plan differs. Another possible issue is the put in reporting their metacognitive strategies. With self-report measurements, there is a risk of social desirability bias, which is when people present themselves on questionnaires in a favorable light, as opposed to reporting their actual thoughts, feelings, or behaviors (Grimm, 2010). Students who do not plan for example, might be too embarrassed to admit they do not use this strategy and will instead report a slightly higher frequency of planning behavior than they actually do. Since offline assessments rely solely on the memory of the learner, accuracy may vary from individual to individual (Veenman, Bavelaar, De Wolf, & Van Haaren, 2014).

More effective measures of metacognition are needed to assess students' use of metacognition. To do so and to be able to create a comprehensive and insightful model of self-regulated learning depends "upon the study of SR while it is being generated." (Boekaerts & Corno, 2005, p. 10). During an online assessment, learner's self-regulatory learning behavior are being generated and exhibited during the testing process, giving researchers the ability to measure metacognitive use and behaviors more definitely (Veenman, Bavelaar, De Wolf, & Van Haaren, 2014).

Some examples of online assessments include observations of students working in the classroom, think-aloud protocols, stimulated recall interviews, and traces of mental events and processes (Veenman, Bavelaar, De Wolf, & Van Haaren, 2014; Boekaerts & Corno, 2005). Observational studies of metacognition involve researchers capturing ongoing behaviors rather than the recalled behaviors of self-report measures. Observations are typically recorded on video, though live observations are also common; both verbal and non-verbal behaviors and classroom interactions are coded and scored for during this observation period (Boekaerts & Corno, 2005). Think-aloud protocols, on the other hand, are assessment strategies in which participants say aloud and/or answer questions about what they are thinking as they go through a metacognitive activity (Boekaerts & Corno, 2005; Veenman, Prins, & Verheij, 2003). Stimulated recall interview measures are similar, although require the participant to describe their actions at a later time. During these interviews, students are interviewed individually while watching videotaped recordings of themselves working through a metacognitive task (Boekaerts & Corno, 2005). This form of assessment allows students to identify and label their own actions as opposed to researchers imposing their own coding system on student behaviors. Finally, traces of mental events and processes involve taking work samples from students such as annotated texts and analyzing the material for use of metacognitive strategies (Boekaerts & Corno, 2005)

Several studies by Veenman and colleagues have attempted to shift the metacognitive research in the direction of online assessments (Veenman, Van Hout-Wolters, & Afferbach, 2006; Veenman, Bavelaar, De Wolf, & Van Haaren, 2014; Veenman, Prins, & Verheij, 2003). For example, Veenman and colleagues (2003) compared the results of undergraduate student self-reports versus think-aloud measures in which they asked students to verbalize thoughts during a reading task. They found that while students were consistent within their self-reports of

expressed study activities, students did not actually perform study activities as often as they had self-reported such behaviors (Veenman, Prins, & Verheij, 2003). This study supports the notion that offline assessments may not be as accurate as researchers might hope.

However, online measures alone are not necessarily better than offline measures. In a later study, Veenman, Bavelaar, De Wolf, and Van Haaren (2014) used the measures akin to mental traces in a computerized ecology learning task in which students could manipulate different ecological variables to see their effects on an otter population. Within the task, participants had the option of manipulating the size of otters' habitat, the environmental pollution, public entrance for visitors, the number of new otter couples, and whether the fish that otters subsisted on where also feed by animal-keepers. Each of the variables had an effect on a virtual otter population. While manipulating those different variables, the program recorded certain metacognitive behaviors such as how often they scrolled to review previous experiments in the task, the duration of time it took for them to make a move in the task, etc., and documented them in log files to be further analyzed by researchers. Surprisingly, they found that the results of the log-file analyses were not at all reflective of measures of students' intelligence, whereas in the 2003 study they found that students' metacognitive use was linked to measures of intelligence (Veenman, Bavelaar, De Wolf, & Van Haaren, 2014; Veenman, Prins, & Verheij, 2003). What the Veenman et al. (2014) study lacked was insight into students' metacognitive considerations and was highly dependent on the subjective interpretations of the researchers. Combining protocols that illicit student commentary of their own learning process such as in the think-aloud pressure, coupled with observations by researchers may produce better results than either measures alone.

**Metacognition and Gameplay**

Videogames have often been regarded as distractions or even detriments to learning. However, new studies have suggested that games are an effective and motivating new way to incorporate technology in the learning process. Targeted game-based learning that focus on teaching students concepts and information has been shown to improve students' motivation, classroom performance, and even self-regulated learning (Monem, 2015; Papastergiou, 2009). Papastergiou (2009) conducted a study with high school students using an educational computer game to teach students computer science. Comparing the students exposed to gaming versus those in a control group who learned though a non-gaming application, she found that digital game-based learning was more effective in promoting students' knowledge and motivation of the subject than the control application (Papastergiou, 2009).

Even non-education videogames such as the popular massively multiplayer online role-playing games (MMORPGs) can be beneficial to forming productive learning behaviors. In a case study following an avid 16-year old male gamer, Monem (2015) found that MMORPGs encouraged the gamer's metacognitive awareness and self-scaffolding wherein the gamer would frequently break down problems in the game into manageable subtasks. In order to survive in an MMORPG, players are required to be highly alert of the game's setting and be able to shift strategies quickly to changing situations. As Monem (2015) described, "the pressure to think and react instantaneously forced [the gamer] to make quick mental connections between existing knowledge and information presented to him in the moment of play" (pp. 462). Both studies indicate that videogames are inherently metacognitive tasks that encourage students to continuously plan, monitor, and evaluate the learning environment.

A study by Kim, Park, and Baek's (2009) further supported this contention. They examined the relationship between metacognition, videogames, and learning by first explaining metacognition to ninth grade students, then having them play an economic-based MMORPG; afterwards, the students were given an achievement test on economics. From their experiments, they found that metacognitive strategies increased students' ability to problem solve during the MMORPG game, which was then later correlated with their scores on academic achievement test (Kim, Park, & Baek, 2009). Applying metacognition to videogames not only gives students the ability to practice using these strategies outside the classroom, but also allows students to see the process as generalizable and useful in non-academic areas.

**Previous Intervention Research at Trinity College**

Previous iterations of the current study have had mixed results regarding the effectiveness of a metacognitive intervention. Godfrey and Lopez (2014) found significant effects of the intervention on students' metacognition and academic performance. Their intervention included an 8-week intervention session with eighth grade students in a social studies classroom, wherein the researchers taught metacognition using the same 5-step model proposed by Ambrose and colleagues (2010). They found significant intervention effects on metacognition from students' self-reported Quantitative MC5 scores and marginally significant intervention effects from their Qualitative MC5 scores. On the other hand, Fulton and Schackner (2015) did not find significant effects of the intervention on students' metacognitive scores using the MC5 assessments. They speculated that the reason for their lack of intervention effects may be partly due to teacher effects, since they had worked with the same highly proficient teacher who had participated in previous versions of the study.

Nonetheless, both studies did find positive correlations between metacognition and academic performance. Godrey and Lopez (2014) also found positive correlations between motivation, metacognition, and academic performance. They found measured students' motivation using the Self-Efficacy scale of the MSLQ and a scale on Ability Beliefs measuring students' beliefs about the malleability of intelligence. While they found that these motivational variables were predictive of students' grades, they did not find significant differences in metacognition between students scoring high and low on motivation. Other aspects of motivation in addition to self-efficacy and ability beliefs may be more implicated in metacognition, leading to their lack of intervention results.

**Implications of Research**

Extant research on self-regulated learning has revealed that typical classrooms lack the necessary instruction of metacognition to students across subjects and grade levels. Due to the overall positive findings supporting direct and embedded instruction of metacognition to students, this suggests that researchers and educators should collaborate with one another to develop effective methods of teaching these academically beneficial skills. The missing gaps in the motivation literature on the role of engagement, emotions, and anxiety suggests that more research needs to be conducted on the motivational aspect of self-regulated learning. Likewise, research on SRL needs to further develop with changing technologies which have allowed both students and researchers to explore metacognition in new ways that can assess the actual use of self-regulatory learning behaviors.

**Current Study**

This study aimed to improve the academic performance of middle-school aged students in the 6th and 8th grade through metacognitive-based intervention sessions in their social studies

classroom. As part of an ongoing research program of the effects of metacognitive-based intervention on academic performance at Trinity College, the current study replicates the basic intervention curriculum used in past studies focused on 8th grade students in social studies (Godfrey & Lopez, 2014; Fulton & Schackner, 2015). This study added a developmental component by including a sixth grade cohort of students, as well as, eighth grade students. This allowed us to explore developmental differences in metacognition and engagement between early and late middle-school aged students. The intervention, *Learn 2 Learn,* was modeled after the Ambrose et al.'s (2010) model of metacognition with each session focused on the at least one aspect of the five-step model or the entire process of metacognitive thinking. Eighth-grade students received a total of eight sessions, while those in the sixth-grade received six condensed sessions. While the intervention was primarily focused on improving students' metacognitive knowledge and awareness, motivational elements were also included, in line with the original Ambrose et al. (2010) model.

Besides adding a younger cohort of students, the current study also explored several new variables of motivation. Specifically, motivation was defined as a function of self-efficacy and its counterpart, test anxiety, achievement values relating to the important of the topic to the student, and student engagement in their respective social studies classroom. All four factors have been correlated with academic performance; however, no specific research has been conducted to assess the effects of the latter two on self-regulated learning and metacognition. The study aims to fill the gaps in SRL-related motivation research by evaluating the implications of students' interest (through achievement values) and engagement on their self-reported use of metacognition and academic performance.

In addition, the current research included a pilot study comparing students' reported use of metacognition with an online assessment assessing metacognition use during a specific task. The online measure used was a Think-Alousd assessment while playing an online emulated version of the 1990 MS-DOS computer game, *The Oregon Trail*.

**Hypotheses**

**Metacognitive awareness.**

**H1:** Students in the experimental group who received metacognitive-based interventions will show a greater increase in their metacognitive awareness (MC5 scores) than the control group who did not receive metacognitive-based interventions.

**H2:** Regardless of intervention, engaged students will show a greater increase in metacognitive awareness than disaffected students.

**H3:** Engagement and intervention will interact such that engaged students in the experimental group will show the greatest increase in their metacognitive awareness, while disaffected students in the control group will show the least increase in their metacognitive awareness.

**Academic performance.**

**H4:** Students in the experimental group who received metacognitive-based interventions will show greater increase in their academic performance (quarter grades) than students in the control group who did not receive metacognitive-based interventions.

**H5:** Regardless of intervention, engaged students will show a greater increase in their academic performance than disaffected students.

**H6:** Engagement and academic performance will interact such engaged students in the experimental group will show the greatest increase in their academic performance, while disaffected students in the control group will show the least.

**Online versus offline assessments.**

**H7:** The online assessment of metacognition (Think-Aloud) will capture active metacognitive use more than the offline assessments of metacognition (MC5).

## Experiment 1: Intervention Study

**Methods**

**Participants.**

The participants (N = 149) in this study consisted of a sample of sixth grade students (33 females and 27 males) and eighth grade students (39 females and 50 males) attending a magnet school in Hartford, Connecticut.  Prior to the start of this study, the school's administration and teachers were briefed on its content and ultimate goals and agreed to participate.  The study was also approved by the Institutional Review Board of Trinity College to confirm it met the necessary ethical standards.  In order to obtain consent for the student participants, parents were given a letter explaining the objectives of the study and were asked to provide written approval or disapproval regarding their child's participation (see Appendix A).

Since the participating Hartford magnet school attracts and admits students from various school districts, the study's sample of participants was diverse.  The majority of students identified themselves as Hispanic (31 percent), White (30 percent), or Black (22 percent).  The remainder of students identified themselves as Mixed (13 percent) or Asian (5 percent). Most students designated their hometown as Hartford (45 percent), while the rest came from 24 surrounding towns.

The participants were from four blocks of sixth grade social studies classes taught by one teacher (Teacher A) and four blocks of eighth grade social studies classes taught by another teacher (Teacher B).  This was the first year that Teacher A was involved, whereas Teacher B

had already participated in the study for several years.  The classroom size for sixth grade ranged

from 11 to 20 students (average = 15) and ranged from 21 to 24 (average = 22.5) for the eighth

grade.  Students with special needs and/or language barriers were omitted from the study, as they

would have been unable to complete assessments independently in class.

**Measures.**

The measures utilized in this study were administered to all students at the end of their

first marking period prior to the start of the intervention (pre-testing) and at the end of the third

marking period upon completion of the intervention (post-testing).  Pre-testing and post-testing

periods were broken up into three days of testing for the sixth grade students and two days for

the eighth grade students.  This differentiation was due to the variation in workload capacity

between the grades.  For the sixth graders, quantitative measures were administered during the

first two days of testing and the qualitative measure was administered on the third day.

Meanwhile for the eighth graders, quantitative measures were administered on both the first and

second day, with the qualitative measure also administered on the second day.  All students were

given as much time as required to complete each questionnaire during testing sessions.  Both the

research instructor (RI) and social studies teacher were present throughout the testing sessions in

order to clarify any questions students may have had concerning the measures.

*Demographic information.* The demographic measures were comprised of four items,

regarding the participant's date of birth, sex, race/ethnicity, and hometown (see Appendix C). It

was only administered during the pre-testing stage of the intervention.

*Quantitative Metacognition 5 (Quantitative MC5).* The Quantitative MC5, originally

developed by Howe, Naratil, Reuman, and Anselmi (unpublished, 2012), was administered to the

fourth cohort of students in this ongoing study.  It is a close-ended, self-report measure that

consists of 35 questions based on Ambrose et al.'s (2010) five-step model of metacognition, with seven items corresponding to each respective step. Every question required an answer based on a five-point Likert-style scale, ranging from "Never" to "Always" (see Appendix D). Wording was revised for the current study from "Seldom" to "Rarely" for one of the scale options in order to make the wording more understandable for the sixth grade students. The directions instructed students to answer questions in regards to their social studies class. The scores were computed by finding the average for each participant's responses. Cronbach's alpha was found to be .909 at pre-testing and .928 at post-testing. Individual scales had strong internal consistency reliability as well. Assess the Task items had a Cronbach's alpha of .690 at pre-testing and .751 at post-testing. Evaluate Strengths & Weaknesses items had a Cronbach's alpha of .701 at pre-testing and .728 at post-testing. Plan items had a Cronbach's alpha of .656 at pre-testing and .748 at post-testing. Apply Strategies/Monitor Performance items had a Cronbach's alpha of .761 at pre-testing and .769 at post-testing. Reflect & Adjust items had a Cronbach's alpha of .740 at pre-testing and .784 at post-testing.

***Qualitative Metacognition 5 (Qualitative MC5).*** The Qualitative MC5 is a measure developed by Godfrey, Lopez, Shimmel, sReuman, and Anselmi (2014) and revised by Fulton, Schackner, Sager, Reuman, and Anselmi (2014), consisting of eight open-ended questions based on Ambrose et al.'s (2010) five-step model of metacognition (see Appendix I). The measure was designed with tasks for a social studies class in mind, with questions such as "Do you usually make sure you understand the purpose of an assignment or project in history class? Explain why or why not". The scoring criteria, which consists of a 0 to 3 point scale, was developed by Godfrey, Lopez, Reuman, and Anselmi (2013) and is based on a system created by van Kraayenoord and Paris (1997) for their "Worksamples Interview". The general guidelines for

scoring were first revised by Fulton, Schackner, Sager, Reuman, and Anselmi (unpublished, 2013) and then by Thomann, Scollard, and Reuman (unpublished, 2016) in order to enhance the relation between the 0-3 scale and each individual question, as well as to increase overall reliability (see Appendix J). Cronbach's alpha was found to be .503 at pre-testing and .614 at post-testing.  Inter-rater reliability was calculated and had an average intra-class correlation of .79 and an average kappa co-efficient of .70.

*Self-efficacy.* The self-efficacy subscale, derived from the MSLQ *(Pintrich & De Groot, 1990)*, was used to measure one aspect of students' motivation. One of the variables considered was students' self-efficacy in terms of their own reflective classroom performance. The Self-Efficacy scale is comprised of nine items on a seven-point Likert scale ranging from "Not at all true of me" to "Very true of me" (see Appendix E). The total score was determined by the average of students' responses to the nine questions. The Self-Efficacy scale of the MSLQ had a Cronbach's alpha of .911 at pre-testing and .932 at post-testing.

*Achievement values.* Another motivational variable assessed was students' achievement values. The achievement values subscale was derived from Wigfield and Eccles (2000) and assessed students' beliefs about their perceived usefulness and interest on the subject of history. The Achievement Values scale is comprised of five items on a seven-point Likert scale ranging from "Not at all useful" to "Very useful" (see Appendix F). The total score was determined by the average of students' responses to the five questions. The Achievement Values subscale had a Cronbach's alpha of .866 at pre-testing and .865 at post-testing.

*Engagement versus Disaffection (EvsD).* The Engagement versus Disaffection scale is a twenty-item questionnaire developed by Wellborn (1991) to assess students' emotional and behavioral engagement or disaffection in the classroom. A version of the assessment for college

students was developed by Chi, Skinner, and Kindermann (2010), which further divided behavioral engagement into in-class, out-of-class, and above and beyond engagement; behavioral disaffection was divided into in-class, care-less, and out-of-class disaffection; and emotional disaffection was divided into boredom, worry, and amotivation categories. The original twenty-item questionnaire was used, including two additional behavioral disaffection items (one from the careless category and the other from the in-class category), one item from emotional disaffection (amotivation), and an alternate emotional disaffection question from the Wellborn (1991) version. Responses for EvsD items were on a four-point Likert scale ranging from "Not at all true" to "Very true" (see Appendix G). The total score for engagement or disaffection was determined by the average of students' responses to the 24 questions; lower scores reflect disaffection in the classroom while high scores reflect more engagement. The Overall Engagement versus Disaffection subscale had a Cronbach's alpha of .907 at pre-testing and .909 at post-testing. The Cronbach's alpha for behavioral engagement was .761 at pre-testing and .721 at post-testing. For behavioral disaffection, the Cronbach's alpha was .804 at pre-testing and .773 post-testing. As for behavioral engagement, the Cronbach's alpha was .821 at pre-testing and .787 at post-testing. Lastly, the Cronbach's alpha for emotional disaffection was .734 at pre-testing and .752 at post-testing.

**Test anxiety.** The Test Anxiety subscale was also derived from the MSLQ and the assessment consisted of five items on a seven-point Likert scale ranging from "Not at all true of me" to "Very true of me" (see Appendix H). The total score was determined by the average of

students' responses to the five questions. The Test Anxiety scale of the MSLQ had a Cronbach's alpha of .749 at pre-testing and .749 at post-testing.

*Academic performance measures.* To assess students' academic performance, quarterly marking period grades for their social studies class were collected from both 6th and 8th grade teachers for the first three marking periods.

**Procedure.**

The intervention took place during the 2015-2016 academic school year and consisted of six in-class sessions for the sixth graders and eight in-class sessions for the eighth graders. Sessions ranged from twenty-five to forty minutes long. Two blocks of social studies classes from each grade were assigned to the experimental condition (*Learn 2 Learn*), while another two blocks from each grade were assigned to the control condition (*Know How 2-HI School* or *College Knowledge*). All experimental and control sessions were conducted by three college student researchers and one college student research assistant.

Pre-testing measures were administered to student participants over the course of three days for the sixth graders and two days for the eighth graders in late-October, around the beginning of their second marking period. After the culmination of the intervention, which had a duration of sixteen weeks (excluding pre- and post-testing periods), post-testing measures were given to student participants in early March. Post-testing measures consisted of the same measures used for pre-testing, minus the demographic questions, and were administered in the original manner.

All confidential information, such as pre- and post-testing documents and consent forms, was held in a locked research laboratory. In addition, participants were each given an identification number at the beginning of the study in order to keep their identities anonymous

when handling and analyzing the data.  Using these unique identification numbers, all

information was de-identified and recorded in an electronic program, which was only accessible

to the researchers.

   ***Experimental treatment sessions.*** Students in the 8th grade received a total of 8

intervention sessions on metacognition, called Learn 2 Learn, while those in 6th grade only

received 6 sessions. The Learn 2 Learn sessions involved individual and group activities and

discussions to foster students' understanding and use of metacognition to improve their academic

performance in their respective social studies classes (see Table 1).

   *Session 1: Introducing* Learn 2 Learn*.*

   The first session for both the 6th and 8th grade introduced metacognition and the *Learn 2*

*Learn* process to the student. The session began with an icebreaker to familiarize the research

instructor (RI) and students with each other. Afterwards, students were handed a *Learn 2 Learn*

folder for them to store materials used throughout the intervention, including a laminated version

of the Ambrose five-step model of metacognition that was adapted for middle-school aged

students. The model was referred to as *Learn 2 Learn Steps* (see Appendix L). After passing out

the folders, the RI briefly introduced the plan for the day, which included a presentation and an

activity with marshmallows. The students watched a presentation with videos about

metacognition to introduce the concept of "thinking about thinking" and to further explain what

the 5-step model means. As the RI went through each of the five steps, she asked students to give

examples of each step that they personally use in the classroom setting, then presented them with

further examples.

   After the presentation, students were then divided into groups of five and instructed to

begin a Tower Building Activity using marshmallows and toothpicks. They were given

approximately ten minutes to build the tallest tower possible that could stand up on its own. No specific instruction was given and students were free to take apart the marshmallows if they pleased.

Later, each group worked together to complete a blank *Learn 2 Learn* model to identify how they applied each metacognitive step to their tower building process (see Appendix M). A class discussion followed on how each group used the *Learn 2 Learn* steps. For example, monitoring allowed groups to assess whether their arrangement of the toothpicks was efficient or needed to be changed; applying various strategies on the other hand, such as dividing the marshmallows into smaller pieces gave students more material to build their tower with.

To conclude the session, the students were given notecards and asked to provide feedback about the activity to the RI as a means of modeling metacognition. The RI explained that learning to learn is a lifelong process, and that even college students needed to use the *Learn 2 Learn* process to do well in their academics.

*Session 2:  motivation.*

The second session for both the 6th and 8th grade focused on motivation, which was the central part of the Ambrose et al. (2010) model, as well as their *Learn 2 Learn* model. Again, students were told the plan for the day, which included a presentation on the topic and a short activity. The presentation covered the notion of fixed versus fluid intelligence and was intended to motivate students by stressing to them that they can learn anything they set their minds to. The topic also covered neuroplasticity, albeit in a simplistic way to make comprehension appropriate for middle-school aged students. Neuroplasticity was described to the students as the idea that the brain is like a muscle that needs to be exercised in order to grown and learn. Following, the RI also discussed the role of emotions and learning, and asked students to share strategies they

used to motivate themselves whenever they felt discouraged or down. After hearing their ideas, the RI presented them with further tips for motivation, such as staying positive, finding value in what they are learning, and setting goals. The presentation further expounded on how to set SMART goals (goals that are specific, measurable, attainable, relevant, and timely). As a brief exercise, the students were asked to analyze one of the RI's personal goals, such as "My goal is to finish my senior project by the Spring so that I can graduate from college", based on the SMART goals criteria.

After the presentation, the RI handed out a brief worksheet called "I Think I Can" (see Appendix N) and asked the students to write one goal they wanted to achieve in their social studies classroom and one "positive power statement" about themselves, their learning, or their classroom that would help them stay motivated to reach their goal.

*Session 3: Metacognition & homework.*

The third session for both the 6th and 8th graders focused on how to use metacognition/the *Learn 2 Learn* steps while completing homework. The session began with the RI handing out a blank *Learn 2 Learn* model to let students practice recalling the *Learn 2 Learn* steps (Appendix O). For each step, students were asked to provide an academic example (e.g. Understand the assignment; example: ask the teacher for help). The RI reviewed the model with the students to make sure they all had the correct steps in order. After the warm-up exercise, the RI facilitated a discussion on how students can use the *Learn 2 Learn* steps to complete assignments with a brief presentation, which included brief videos on different homework and studying strategies. At each step, the RI asked students for strategies they used personally before providing additional examples. Students were then given a homework assignment that asked them to reflect on the

metacognitive process for their next social studies assignment (see Appendix P). The homework reflection worksheets were collected during the next *Learn 2 Learn* session.

    *Session 4*: The Oregon Trail, *metacognition outside the classroom (8th grade only).*

    As preparation for the second study on online versus offline assessments of metacognition, the fourth session for 8th graders showed them how metacognition can be applied to non-academic areas, such as the videogame, *The Oregon Trail*.  Fortunately, the 8th grade social studies curriculum was at the time focused on Westward Expansion, allowing the introduction of the game to be smoothly integrated into the *Learn 2 Learn* lesson plan. The RI modeled how the *Learn 2 Learn* process and metacognition could be applied while playing *The Oregon Trail*. With help from the class, the RI played *The Oregon Trail* for approximately 20 minutes (displayed on the projector) while relating each decision or action they made back to *Learn 2 Learn*.  For instance, looking at the map within the game was an example of monitoring and applying strategies. Students were then handed out another blank *Learn 2 Learn* model, which again asked students to recall the steps, but this time to fill in example of each step relating to how the class played the game (see Appendix Q).

    *Winter Booklet (see Appendix R & S).*

    Before the close of the fall semester, the RI briefly visited the students to bring a "Winter Booklet" that they were asked to complete over winter break. It consisted of four activities for the 6th graders and five activities for the 8th graders. The first activity asked the students to complete a blank *Learn 2 Learn* model with the correct steps in the process, as well as examples of each step. The second activity asked the students to read two vignettes about two college students, Alex and Jesse, writing history papers for their class. Students were asked to think

about how metacognitive Alex and Jesse were by assessing which *Learn 2 Learn* step each boy used to write their papers.

For the 6th graders, the fourth and final activity asked them to brainstorm and create a new civilization, which matched with their social studies curriculum at that time. Each question in the activity was designed to correspond with a *Learn 2 Learn* step, and students were asked to determine which metacognitive step was used after completing each activity question.

For the 8th graders, the fourth activity was entitled "Lewis & Clark Expedition" activity and was structured similarly to the 6th graders' New Civilization activity. For the "Lewis & Clark Expedition", students were asked to brainstorm and think about strategies they would use if they were to embark west at the time of Lewis & Clark. Again, each question was designed to correspond with a *Learn 2 Learn* step, and students were asked to determine which step was used after completing each activity question. The final activity for the 8th grade version of the Winter Booklet asked students to play *The Oregon Trail* by themselves at least three times, once for each occupation. They were then asked to answer questions about their in-game decisions and their thought processes for each position in order to prepare for the think-aloud assessments for the second study.

*Session 4/5: The Winter Booklet review.*

The first session of the spring term was the fourth session overall for the 6th graders and the fifth for the 8th graders. During this session, the RI reviewed the Winter Booklet with the students to ensure each activity was completed and fully understood. The review session began by going over the *Learn 2 Learn* steps again in the first activity, followed by students sharing their answers on the vignettes.

In the 6th grade classrooms, students shared their strategies for completing their New Civilization activity and how the process related to the *Learn 2 Learn* steps.

Similarly, in the 8th grade classrooms, students shared strategies they would use if they were to embark on a Westward journey for the Lewis & Clark activity and discussed how the activity related to *Learn 2 Learn*. They also shared strategies they used when they played *The Oregon Trail*.

Students in both grades who completed the whole packet on time received a five-dollar Subway gift card as an incentive.

*Session 5/6: The Writing Process (part 1).*

For 6th graders, their fifth session focused on the entire writing process and how it relates to the *Learn 2 Learn* steps. Again, students were given a presentation on the writing process from the planning phase to the editing phase, completing the *Learn 2 Learn* process. After the presentation, the RI handed out an activity to the students asking them to create writing goals for themselves, as well as a plan to achieve those goals (see Appendix T)

For the 8th graders, their sixth session gave a general overview of the writing process and its relationship to metacognition as well, but with specific attention on planning and outlining, which corresponded to the first through third steps of *Learn 2 Learn* (i.e. understanding the assignment, knowing strengths & weaknesses, planning). The session coincided with a long-term research paper assignment in the class on inventions and was designed to aid students' completion of their papers. The 8th graders were also given the same activity as the 6th graders, but were asked to give themselves deadlines for each step in their plan to achieve their writing goals.

*Session 7: The Writing Process, part 2 (8th grade only).*

The second session on the writing process was given only to 8th grade students who were at the time finalizing their inventions paper. This session focused primarily on drafting and the revision process (which corresponded to the monitoring performance/applying strategies and reflecting and adjusting portion of *Learn 2 Learn*). Again, the RI gave a presentation on the topic, which included a video modeling how to turn their outlines completed after the previous session into drafts. The RI also provided students tips on how to revise and edit their papers before turning them in. To further aid the students in their writing assignment, the RI handed out a Writing Process Revision Checklist (see Appendix U) which modeled the revision process and gave students a list of must-dos to ensure that they were revising their papers thoroughly and efficiently.

*Session 6/8: Review.*

For the last session in both the 6th and 8th grade, the class played a *Learn 2 Learn* Jeopardy game to review the use of study skills and *Learn 2 Learn* steps taught throughout the intervention. Students were split into five teams to ensure the game proceeded orderly, while the classroom teacher assisted in keeping score for the game. The game provided the students with a fun opportunity to test what they learned about various learning strategies, specifically when to use a specific strategy and its purpose. If groups ended up in a tie, the tiebreaker question consisted of each group of students listing the five *Learn 2 Learn* Steps in the proper order. Candy and magnet prizes were given to the winning group of students.

***Control treatment sessions.*** The control group for the sixth grade (Know How 2-HI School) received six sessions focused on school transitions and career paths, whereas the eighth grade (College Knowledge) received eight sessions focused on various aspects of college and the application process. Two different control programs were used because learning specifically

about college was deemed less suitable and relevant for the younger students, just as talking about school transitions was determined to be less beneficial for the eighth graders.

*Session 1.*

The first session for the sixth grade began with an introduction to the *Know How 2-HI School* curriculum and an overview on transitions. The RI had the students describe what they knew about transitions, their experiences with transitioning from elementary school to middle school, and what they thought a transition into high school would entail. Responses were recorded on the board and categorized into categories (e.g. emotions, differences in responsibilities, changes in social structure). The session closed with a discussion about new freedoms that would be encountered in high school and what increased responsibilities would come with those freedoms.

For the eighth grade, the first session opened with an overview of the *College Knowledge* program and a "Snowball" fight icebreaker so that the RI and students could get to know one another. It then transitioned into an interactive discussion about the students' ideal jobs and potential reasons for wanting to enter into those respective professions (e.g. good financial compensation, corresponds with interest, etc.). Various components like pay scales, school investment, and percentage of people in each profession were shown on the Smart Board.

*Session 2.*

The second session for the sixth grade focused on objective differences between middle school and high school and the expectations that come with young adulthood. The structure of high school class schedules, types of social studies homework assignments, and change in

student population were then discussed. The session ended with a general discussion about what high school teachers value the most in their students (e.g. academic honesty, acceptance of others, responsible citizenship).

The eighth grade's second session centered on the different types of colleges/universities and the positives and negatives of each type of school. The RI had the students do a group activity where they were broken up into groups and had to pick a piece of folded paper at random that had a specific question about college on it (e.g. "What does it mean to be a private college/university?") and then had them each answer their question to the best of their abilities. The RI then elaborated on all the answers the students provided to the questions.

*Session 3.*

For the third session for the sixth grade, the RI discussed with the students how they could guide their own education through factors like class choice, school choice, and alternative pathways. Students were taught about electives and various kinds of training methods, as well as exciting possibilities they could look forward to for high school (e.g. dress code changes, taking classes at Trinity, having their phones).

The third session for the eighth grade focused on reasons for attending college and the advantages of pursuing higher education. Discussion included elements like improving chances of achieving later success in desired occupations, yearly salaries based on educational attainment, social opportunities at college, and how everyone defines success differently.

*Session 4.*

The sixth grade's fourth session shifted from the previous discussion on variances in education to a general discussion of employment. Students were asked to describe their career aspirations and a combination of a slideshow and guided discussion was then used to describe

various jobs, related educational schooling components, and academic focuses. The session

fixated on the importance of each educational step for achieving their individual goals.

The fourth session for the eighth grade concentrated on the teaching of the Oregon Trail

PC game and having the students practice playing the game as a class. Guidelines for playing

the game during the winter break period were given out to the students (see Appendix V),

directing them to play at least three times in order to make sure they understood the objective

and basic structure of the game.

*Session 5.*

For the sixth grade's fifth session, emphasis was placed on educational niches, especially

in regards to educational fields the students might not have been as familiar with (e.g.

anthropology, sports management, creative writing). Various majors were written on the board

and the academic skills they require and what careers they encompass were described. Students

were then invited to explain any unique career paths or majors they were interested in potentially

pursuing in the future.

The eight grade's fifth session began with the RI handing out index cards for the students,

asking them to write down various aspects of playing the Oregon Trail game over their winter

break (e.g. Did you play the Oregon Trail? How many times? With which professions did you

win?). A poll was then taken regarding where the students wanted to go to college and later the

class' statistics and a variety of celebrities who went to college were shown on the board.

*Session 6.*

The sixth session for the sixth grade entailed the RI explaining how interests may shift

overtime and how students will most likely have try out an array of jobs before encountering the

one they find they are most passionate about. As this was the last session, students were also

given the opportunity to ask any questions regarding the *Know How 2-HI School* program, what they had learned, and any curiosities they had about Trinity College.

Meanwhile, the sixth session for the eighth grade focused on how to pick a college properly and what the students hoped to accomplish there. The RI described the reasons she had chosen to attend Trinity College and asked the students their reasons for going to school. She then went over various types of degrees needed for specific occupations, along with potentially important factors for deciding on a college, like school size, academic rigor, affordability, etc.

*Session 7 (8th grade only).*

The seventh session for the eighth grade consisted of a discussion about the college application process, how students can get started on them early, and different tips and tricks for getting ahead. Index cards were handed out at the beginning of class, where students were invited to write down questions they might have had about the application process that they did not understand or were embarrassed to ask about publicly. The RI then answered the collected questions.

*Session 8 (8th grade only).*

The eighth and last session for the eighth grade summarized what the students had discussed throughout the *College Knowledge* program, such as where they all wanted to go to college and what celebrities went to college. Final questions and comments were encouraged and students provided feedback on the usefulness of the program itself.

**Results**

**Correlations among measures.**

Correlations among the Quantitative MC5, the Qualitative MC5, motivational measures (Self-Efficacy, Achievement Values, Engagement vs. Disaffection, and Test Anxiety), along

with quarterly grades were calculated (Table 2). Both measures of metacognition correlated positively with each other. The Quantitative MC5 correlated positively with Qualitative MC5 at both pre-testing (.30) and post-testing (.38). Furthermore, metacognition measures positively correlated with students' academic performance measured using quarterly grades, although the quantitative version was found to be a better predictor of grades. The Quantitative MC5 correlated positively with quarterly grades at pre-testing (range=.39 to .43) and post-testing (range=.46 to .51). Similarly, the Qualitative MC5 correlated positively with quarterly grades at pre-testing (range=.27 to .33) and post-testing (range=.38 to .41).

Metacognition scores also positively correlated with all motivational measures except Test Anxiety. Both Quantitative and Qualitative MC5 scores correlated positively with Self-Efficacy scores at pre-testing ($r$=.63 and $r$=.22) and post-testing ($r$=.60 and $r$=.29). Quantitative and Qualitative MC5 scores correlated positively with Achievement Value scores at pre-testing ($r$=.53 and $r$=.19) and post-testing ($r$=.51 and $r$=.33). Engagement proved to be a better predictor of Quantitative MC5 scores and grades. Quantitative and Qualitative MC5 scores correlated positively with Engagement vs. Disaffection scores at pre-testing ($r$=.70 and $r$=.29) and post-testing ($r$=.73 and $r$=.35). Moreover, EvsD scores positively correlated with quarterly grades at pre-testing (range = .43 to .51) and post-testing (range = .48 to .55). On the other hand, Test Anxiety only significantly correlated negatively with Quantitative MC5 scores at pre-testing (-.21) and positively with Qualitative MC5 scores at post-testing (.17). Test Anxiety had a weak negative correlation with quarterly grades both at pre-testing (range = -.13 to -.06) and post-testing (range = -.12 to -.01).

**Quantitative MC5.**

The effects of the intervention on the Quantitative MC5 scores are shown both in Figure 1 and Table 3. A repeated-measures ANOVA was conducted for this measure with condition as the between-subjects factor and time as the within-subjects factor. The main effect of time on Quantitative MC5 score only approached significance, $F(1, 136) = 3.67$, $p = .06$, partial $\eta^2 =$ .026. Likewise, there was no main effect of condition, $F(1, 136) = 0.77$, $p = .38$, partial $\eta^2 =$ .006. And, contrary to the hypothesis, there was no interaction effect of time by condition (i.e. the intervention) on students' metacognition measured by average Quantitative MC5, $F(1, 136)$ $= 2.56$, $p = .11$, partial $\eta^2 = .018$, although the pattern approached the predicted one. However, there was a significant effect of grade level on Quantitative MC5 scores, $F(1, 136) = 8.36$, $p =$ .004, partial $\eta^2 = .058$, with 6th graders scoring higher in metacognition ($M = 3.69$, $SE = .07$) than 8th graders ($M = 3.44$, $SE = .06$) (see Figure 2). Moreover, there is also a significant time by grade interaction, $F(1, 136) = 4.02$, $p = .05$, partial $\eta^2 = .029$. Overall, 6th graders did not show change over time while 8th graders increased in MC5 scores (see Figure 3).

A 4-factor repeated measures ANOVA was performed to evaluate each metacognitive step assessed by the Quantitative MC5. There was a significant main effect of step, $F(4, 544) =$ 59.13, $p \leq .001$, partial $\eta^2 = .303$. Means are highest for "Assess the Task" and "Reflect and Adjust", somewhat lower for "Apply Strategies / Monitor Performance" and "Evaluate Strengths and Weaknesses", and lowest for "Planning" (see Figure 4). Moreover, there was a significant interaction effect of grade level by step, $F(4, 544) = 3.72$, $p = .005$, partial $\eta^2 = .027$. Overall, 6th graders reported using each of the five metacognitive steps assessed by the Quantitative MC5 more than 8th graders but the difference was larger at "Assess the Task" and "Planning" and

smaller at "Apply Strategies / Monitor Performance". Table 4 shows the differences between 6th

grade and 8th grade in reported metacognition usage for each MC5 step.

**Qualitative MC5.**

Descriptive statistics for the predictors of the Qualitative MC5 are shown in Table 5. A 4-

factor repeated measures ANOVA was performed to evaluate effects of intervention condition,

time, and grade level on each metacognitive step assessed in Qualitative MC5. Contrary to the

hypothesis, there was no interaction effect involving the intervention and time on Qualitative

MC5 scores, $F$ (1, 135) = 2.17, $p$ = .14, partial $\eta^2$ = .016 (see Figure 5). However, there were two

other significant main effects. There was a significant overall effect of condition, $F$ (1, 135) =

3.97, $p$ = .048, partial $\eta^2$ = .029, with those in the experimental group reporting higher

metacognition ($M$ = 2.09, $SE$ =.04) than those in the control groups ($M$ = 1.98, $SE$ = .04). Like

the Quantitative MC5, there was a significant main effect of step in the Qualitative MC5, $F$ (7,

945) = 48.63, $p$ < .001, partial $\eta^2$ = .265. Again, means are highest for "Assess the Task" and

"Reflect and Adjust", somewhat lower for "Apply Strategies / Monitor Performance"; however,

"Planning" was reported higher than "Evaluate Strengths and Weaknesses", which was the

lowest, in the Qualitative MC5 (see Figure 6).

There were a few interaction effects with students' Qualitative MC5 scores. First, there

was a significant grade by step interaction, $F$ (7, 945) = 4.47, $p$ < .001, partial $\eta^2$ = .032 (Figure

7). There was a significant difference for item 1 of the Qualitative MC5 ("At the beginning of an

assignment or project for your history class, what would you do if you did not understand the

directions?") for "Assess the Task" with students in the 8th grade scoring higher ($M$ = 2.40, $SE$ =

.04) than 6th graders ($M$ = 2.21, $SE$ = .05). However, there was a significant difference on item 2

on "Assess the Task" ("Do you usually make sure you understand the purpose of an assignment

or project in history class?") with students in the 6$^{th}$ grade scoring higher ($M$ = 2.26, $SE$ = .07) than 8$^{th}$ graders ($M$ = 2.20, $SE$ = .06). Additionally, there was a significant difference for item 4 for "Evaluate Strengths and Weaknesses" ("What are some skills you need to improve on in history class?") with students in the 8$^{th}$ grade scoring higher ($M$ = 1.72, $SE$ = .06) than 6$^{th}$ graders ($M$ = 1.30, $SE$ = .08).

Also, there was a significant three-way interaction among condition, time, and grade $F$ (1, 135) = 5.23, $p$ = .02, partial $\eta^2$ = .037, with 6$^{th}$ graders, but not 8$^{th}$ graders, showing the predicted pattern of improvement in Qualitative MC5 scores in the *Learn 2 Learn* condition (see Table 5 and Figure 8). Aggregating all the factors, a four-way interaction among condition, time, grade, and Qualitative MC5 scores was also found, $F$ (7, 945) = 2.31, $p$ = .02, partial $\eta^2$ = .017.

**Teacher ratings of metacognition.**

There was a significant effect of time on teachers' ratings of metacognition, $F$ (1, 141) = 240.74, $p$ < .001, partial $\eta^2$ = .631 (see Figure 9). Teacher's ratings of students' metacognition generally increased from pre-testing ($M$ =3.41, $SE$ =.11) to post-testing ($M$ = 4.62, $SE$ =.11). There was no significant interaction effect involving intervention and time on teacher's ratings, $F$ (1, 141) = 1.38, $p$ = .24, partial $\eta^2$ = .010. However, there was a significant interaction of time by grade level, $F$ (1, 141) = 30.20, $p$ < .001, partial $\eta^2$ = .176. At pre-testing, students in the 6$^{th}$ grade had lower mean scores ($M$ = 3.22, $SE$ =.17) compared to 8$^{th}$ graders ($M$ = 3.61, $SE$ =.15). However, by post-testing, 6$^{th}$ graders had higher scores ($M$ =4.85, $SE$ =.17) compared to 8$^{th}$ graders ($M$ =4.39, $SE$ =.14).

**Academic performance.**

Quarterly grades means for condition and grade level are reported in Figure 10 and Table 7. Contrary to the hypothesis, the intervention had no significant effect on students' academic

performance over Quarters 1 through 3. The time by condition effect was non-significant, $F$ (2, 284) = 0.85, $p$ = .43, partial $\eta^2$ = .006. However, there was a significant main effect of time, $F$ (2, 284) = 33.25, $p$ > .001, partial $\eta^2$ = .190. Academic performance was highest at quarter 1 ($M$ = 87.7, $SD$ = 10.4), then declined at quarter 2 ($M$ = 82.8, $SD$ = 12.4), but had stabilized again at quarter 3 ($M$ = 84.1, $SD$ = 13.2). Similarly, there was a significant main effect of grade level on academic performance, $F$ (1, 142) = 16.89, $p$ < .001, partial $\eta^2$ = .106. Overall, 6th graders had higher grades/academic performance ($M$ = 89.4, $SE$ = 1.41) than 8th graders ($M$ = 81.8, $SE$ = 1.17). There was a significant time by grade level interaction effect, $F$ (2, 284) = 6.12, $p$ = .003, partial $\eta^2$ = .041 (see Figure 11). Finally, there was a marginally significant three-way interaction between condition, time, and grade level, $F$ (2, 284) = 2.94, $p$ = .054, partial $\eta^2$ = .020.

**Self-efficacy.**

A repeated-measures ANOVA was also conducted for the analysis of effects of time, condition and grade level on this measure. There was a significant time by condition interaction effect on students' self-efficacy score, $F$ (1, 136) = 4.16, $p$ = .04, partial $\eta^2$ = .030. Therefore, the intervention did have a significant effect, although not in the predicted direction. Students in the *Learn 2 Learn* scored lower during pre-testing ($M$ = 5.18, $SE$ = .13) than those in the control ($M$ = 5.49, $SE$ = .13). At post-testing, students in *Learn 2 Learn* reported an increase in self-efficacy scores ($M$ = 5.42, $SE$ = .13), while those in the control remained unchanged ($M$ = 5.42, $SE$ = .13). Additionally, there was a main effect of grade level, $F$ (1, 136) = 7.29, $p$ = .008, partial $\eta^2$ = .051, with 6th graders ($M$ = 5.61, $SE$ = .13) reporting higher self-efficacy than 8th graders ($M$ = 5.15, $SE$ = .11) (see Figure 12).

**Achievement values.**

A repeated-measures ANOVA was also conducted for the analysis of effects of time, condition, and grade level on this measure. There was no significant time by condition interaction effect on students' achievement values score, $F(1, 136) = 0.66$, $p = .42$, partial $\eta^2 = .005$. Therefore, the intervention did not have a significant effect on students' achievement values. However, there was a significant main effect of time across both conditions, $F(1, 136) = 9.61$, $p = .002$, partial $\eta^2 = .066$, albeit not in the predicted direction. Students reported higher achievement values at pre-testing ($M = 5.05$, $SE = .11$) than at post-testing ($M = 4.75$, $SE = .13$). Unlike the other motivational measures, there was additionally no significant grade level effect, $F(1, 136) = .36$, $p = .55$, partial $\eta^2 = .003$.

**Engagement versus disaffection.**

A repeated-measures ANOVA was also conducted for the analysis of effects of time, condition, and grade level on this measure. There was no significant intervention (time by condition) effect on students' overall Engagement versus Disaffection scores, $F(1, 138) = 0.30$, $p = .58$, partial $\eta^2 = .002$. The only predictor of overall EvsD scores was grade level, $F(1, 138) = 23.74$, $p < .001$, partial $\eta^2 = .147$, with 6th graders again reporting higher overall EvsD ($M = 3.30$, $SE = .05$) scores than 8th graders ($M = 2.98$, $SE = .04$) (see Figure 13).

For each component of the Engagement versus Disaffection questionnaire, there was a significant main effect of grade. Between the two grade levels, there was a significant difference in behavioral engagement scores, $F(1, 138) = 24.05$, $p < .001$, partial $\eta^2 = .148$. Across both conditions, 6th grades had higher behavioral engagement scores ($M = 3.63$, $SE = .05$) than 8th graders ($M = 3.39$, $SE = .06$). Conversely, there was a significant difference in behavioral disaffection scores between grades, $F(1, 138) = 30.35$, $p < .001$, partial $\eta^2 = .180$ with 6th

graders scoring higher ($M$ = 3.24, $SE$ = .06) than 8th graders ($M$ = 2.78, $SE$ = .05). The EvsD

scale was designed so that higher scores always reflected engagement while lower scores

reflected disaffection. Therefore, 8th graders reported more behavioral disaffection than 6th

graders. There was also a significant main effect of grade level on emotional engagement scores,

$F$ (1, 138) = 13.75, $p$ < .001, partial $\eta^2$ = .091. As with the other components, 6th graders reported

higher emotional engagement ($M$ = 3.39, $SE$ = .06) than 8th graders ($M$ = 3.09, $SE$ = .05).

Similarly, there was a significant main effect of emotional disaffection scores, $F$ (1, 138) = 7.43,

$p$ = .007, partial $\eta^2$ = .051. Again, 8th graders reported lower scores ($M$ = 2.73, $SE$ = .05) and thus

exhibited more emotional disaffection compared to 6th graders ($M$ = 2.95, $SE$ = .07) (See Figure

13). Additionally, there was a significant time effect for emotional disaffection, $F$ (1, 138) =

7.31, $p$ = .008, partial $\eta^2$ = .050. Students across both conditions in both grade levels reported

higher scores at post-testing ($M$ =2.89, $SE$ = .05) than pre-testing ($M$ =2.79, $SE$ = .05).

**Test anxiety.**

A repeated-measures ANOVA was also conducted for the analysis of effects of time,

condition, and grade level on this measure. There was a significant time by condition interaction

effect on students' Test Anxiety scores, $F$ (1, 138) = 7.23, $p$ = .008, partial $\eta^2$ = .050. Therefore,

the intervention did have a significant effect, although not in the predicted direction. At pre-

testing, students in *Learn 2 Learn* scored similarly in test anxiety ($M$ = 3.88, $SE$ =.17) *as* those

in the control groups ($M$ = 3.96, $SE$ =.17). However, at post-testing, students in *Learn 2 Learn*

had significantly higher test anxiety scores ($M$ = 4.26, $SE$ =.16), while those in the control

groups decreased their test anxiety scores ($M$ = 3.81, $SE$ =.16).

Additionally, like the other motivational measures, there was a main effect of grade level, $F$ (1, 138) = 7.79, $p$ = .006, partial $\eta^2$ = .053, with 6th graders having lower test anxiety scores ($M$ = 3.69, $SE$ =.16) than 8th graders ($M$ = 4.28, $SE$ =.13) (see Figure 14).

**Discussion**

Studies have found that metacognition and self-regulated learning have a positive effect on academic performance (Pintrich & De Groot, 1990). Moreover, research has found that SRL training and metacognition-based interventions improve students' metacognitive abilities, and subsequently, their academic performance (Dignath & Buttner, 2008). The purpose of the current study was to improve metacognitive abilities and academic performance in both early and late middle-school aged students through an intervention based on the Ambrose et al. (2010) model of metacognition. However, despite confirming the positive correlation between metacognition and academic performance, the metacognitive intervention did not produce the predicted results for students in the *Learn 2 Learn* groups.

This study sought to replicate and extend the significant results found in Godfrey and Lopez (2014), by adding a developmental component of 6th grade students compared to 8th grade students. Godfrey and Lopez (2014) implemented the same basic metacognitive curriculum to 8th grade students in social studies, and found that the *Learn 2 Learn* intervention increased students' metacognition and subsequently, academic performance. The study design was replicated by Fulton and Schackner (2015); however, no significant intervention results were found. Aiming to increase the effectiveness of the interventions, some modifications were made to the *Learn 2 Learn* curriculum in order to make them more interactive and engaging. Most sessions with discussions included a multimedia component, usually in the form of short form videos, in order to provide visual models of metacognitive strategies to students. Furthermore,

more practice familiarizing students with the *Learn 2 Learn* model were embedded in the session

activities based on Ambrose and colleagues' (2010) claim that practice is necessary to mold

students into self-directed learners. Nonetheless, these modifications did not produce significant

gains in students' metacognition scores.

A plausible explanation for the lack of intervention effects may be because the teachers

included in the study were already teaching their students certain aspects of metacognition. A

separate concurrent study conducted by Sik (2016) assessed the metacognitive knowledge and

use of strategies by the teachers involved in this study. Overall, Sik (2016) found that the

participating teachers' knowledge and use of metacognition were above the average based on

both video recorded evidence and survey results. In particular, she found that both teachers

involved in the study demonstrated and modeled planning, monitoring, and evaluating in their

instructions more often than average teachers. Furthermore, through an additional self-report

survey questionnaire, the Teachers' Metacognition Scale developed by Spruce and Boi (2015),

she found that both teachers scored above average in their procedural knowledge of

metacognition, meaning they were highly aware of the importance of making students mindful of

metacognitive thinking processes, and would provide their students with instances to apply these

processes.

While this may explain why the current main study did not find a significant effect of the

intervention, the individual teachers' scores are not consistent with my findings concerning grade

level effects on metacognition. Consistently, 6th graders scored higher in both qualitative and

quantitative measures of metacognition across conditions at both testing times. Unlike the results

of this study, the study on the teachers' own metacognition revealed that the 8th grade teacher

used more planning, monitoring, and evaluating than the 6th grade teacher. However, as

previously mentioned, the opposite was found with their respective students. Hence, there appears to be another confound impeding the instruction and transfer of metacognitive knowledge from teacher to students at the 8th grade level.

Results from the motivation variables assessed in the study may further reveal the reason for this quandary. For two of the measures – Achievement Values and Engagement versus Disaffection – there were no significant differences in students' motivation resulting from the intervention. However, significant differences were found for Self-Efficacy and Test Anxiety, albeit in the opposite direction of what was predicted. Surprisingly, students' self-efficacy decreased between pre-testing and post-testing, while test anxiety increased. Considering that there are grade levels effects mirroring the same pattern for these two measures (i.e., students in the 8th grade had lower self-efficacy and higher test anxiety than 6th graders), the time by condition effect found amongst all students collectively may not be a result of the intervention alone. No main effect of time was found, but perhaps the addition of the intervention on top of regular classroom work may have exacerbated the general decrease of motivation and increase in anxiety for students in school. With the sessions, students in the intervention may have felt as though their learning habits were not enough and thus felt more pressure in their schoolwork. With motivation stunted, metacognition is also being blocked. According to Veenman and colleagues (2006), metacognition use can be interfered with when students perceive a task as extremely difficult, lack motivation, or experience high levels of anxiety.

Further evidence of the effects of motivation on metacognition can be found with the Engagement versus Disaffection subscale. Unlike the Self-Efficacy and Test Anxiety subscale, there were only grade level effects and not time by condition effects. Again, 6th graders scored higher in engagement than 8th graders overall and across all subcomponents of the EvsD scale

(i.e., emotional engagement, behavioral engagement, emotional disaffection, and behavioral disaffection). While no hypothesis was generated on the developmental aspect of motivation and metacognition, the assumption was that as students become more self-directed learners, both metacognition and motivation would increase with age. This was not the case however, Dignath & Buttner (2008) found that motivation was higher in children, and generally, students lose interest with increased age in learning.

This conclusion was reaffirmed after further inquiry about the participating school's philosophy. Due to the fact that the participating middle-school was a magnet school and preselected students to enroll, many of the students during their first year as 6th graders are excited and honored to be there. One teacher in the study explained that the school tries to make sure that 6th graders are welcomed so that they feel integrated in the school. On the other hand, by 8th grade, expectations from the school are much higher as students are expected to improve their scores in standardized state exams from the previous years. Likewise, many 8th graders also feel individualized pressure as they transfer to private high schools. Additionally, while the study was restricted to social studies classrooms, there is a marked difference in the academic demands of 6th and 8th grade, which may be contributing to the older students' lack of self-efficacy. Overall, these environmental factors seem to play a role in the general downturn from early to late middle school years in terms of motivation that may be implicated in students' decrease in metacognition.

Despite all the aforementioned unexpected results, the study did confirm that both motivation and metacognition are important predictors of academic performance. All measures of motivation, metacognition, and academic performance, with the exception of Test Anxiety, positively correlated with each other. Test Anxiety's negative correlation is not unusual though,

as anxiety towards a task leads to decreased metacognition (Pintrich & De Groot, 1990).

Students who scored high in motivation and low on test anxiety, in this case 6th grade students

more than 8th graders, reported higher use of metacognition as measured in both the Quantitative

and Qualitative MC5, which correspond with higher quarterly grades. Therefore, while the

intervention in this study did not produce the desired effects (again, perhaps due to teacher

confounds), schools should consider implementing explicit instruction of metacognition as part

of their curricula in order to enhance academic performance.

**Limitations and further research.**

The marginally significant results of the intervention that were attained in this study were

partly due to some implementation limitations. One such limitation is the intensity of the

intervention sessions. Despite spanning over multiple marking periods, students in the 6th grade

only received six sessions, while 8th graders received eight sessions. While the research

instructor did provide students with group based discussions and worksheets practicing the skills

focused on from each session, students simply did not have enough explicit practice with the

metacognitive skills discussed at each session. Sessions need to be either longer or more

frequent. Additionally, practice between sessions is important. Although studies involving

researchers as instructors for metacognitive training have been shown to be more effective than

just classroom teachers (Paris & Paris, 2001), more collaborative efforts between the research

instructors and teachers are needed to ensure that students in the experimental group are

receiving more metacognitive training than those in the control. Additionally, while the RIs

involved in the study were aware of the theoretical principles of metacognition, no formal

training on how to educate middle school students on metacognition.

Another limitation of the study is the participating teachers. As previously mentioned, a potential confounding issue is possible the teacher effects. Not only are the teachers involved in the study scoring above average in their own metacognitive knowledge and use of strategies, the study also had one teacher who had been involved in previous versions of this study. Thus, the teacher may have embedded some aspects of the intervention in the classroom regardless of the students' assigned condition in the study. Thus, future research should focus on replicating and analyzing the characteristics of effective metacognitive interventions.

### Experiment 2: Online Measure of Metacognition (Pilot Study)

**Methods**

The second study was a pilot test of the efficacy of online measurements versus offline measurements of metacognition.  Specifically, a think-aloud protocol was administered while students played a videogame, *The Oregon Trail*. Participants in this pilot study played the 1990 MS-DOS version of *The Oregon Trail*. The game was originally designed to teach students about the lives of pioneers during the time of Westward Expansion in American history around the 19th century. *The Oregon Trail* takes place in 1848 and asks the player to assume the role of Wagon Leader taking his or her party from Independence, Missouri to Oregon. Based on the game's description and the assessment of the game by the study's researchers, it was determined that *The Oregon Trail* was a task that required high levels of metacognition.

**Participants.**

The participants (N=20; 10 females and 10 males) were a randomly-selected subset of the 8th grade social studies students in Study 1. Half of the participants were taken from the *Learn 2 Learn* experimental group, while the other half were taken from the *College Knowledge* control group.

The school administration, teachers, students, and parents were informed and agreed to participate under the same protocols as Study 1. The study was approved under the same IRB registration as Study 1.

**Measures.**

***Quantitative "Oregon Trail" online measurement.*** While participants played The Oregon Trail, the RI carefully monitored and counted how many times students performed a metacognitive strategy during the game (see Appendix K). These strategies included how many times the participant chose to:

(1) "Size up the situation" (monitor performance and apply strategies)

(2) Check supplies (monitor performance and apply strategies)

(3) Look at map (monitor performance and apply strategies)

(4) Change pace (reflect/adjust)

(5) Change food rations (reflect/adjust)

(6) Stop to rest (reflect/adjust)

(7) Attempt to trade (reflect/adjust)

(8) Talk to people (monitor performance and apply strategies)

(9) Go hunting (reflect/adjust)

(10) Buy supplies (reflect/adjust)

Additionally, the RI counted how many times the students encountered obstacles throughout the game, as well as how many wagon members died throughout the game as evidence of lack of metacognitive skills.

The quantitative online measurements were standardized, and the items relating to "times talked to people" and "number dead" were dropped because they did not correlate with the rest of the measures. The Cronbach's alpha is .774.

**Procedure.**

In order to prepare participants, the RI had all students in their Study 1 sessions practice playing *The Oregon Trail*. As previously mentioned, the RI working with the *Learn 2 Learn* group provided students with an activity in their Winter Booklet, while the control group were asked to complete a worksheet about careers in the past. The participants for Study 2 were randomly selected from the students who returned their Winter Booklet and historical career worksheets.

Participants left their respective social studies classes to take part in the study. Each participant was assigned to one researcher who gave students information about the study and who prompted the participant to answer questions during testing. While playing the game, the researcher asked his or her participant questions probing the participant to explain why he or she made certain decisions or actions throughout the game (see Appendix W for interview example). At the same time, the researcher carefully tallied how many times the participant performed certain actions (see Appendix K) to gather quantitative data on online use of metacognition.

Participants' games were screen-recorded and their responses audio-recorded for later transcription.

**Results**

**Quantitative "Oregon Trail" online measurement.**

The tallies for each of the quantitative "Oregon Trail" online measurement of metacognition, were aggregated and correlated with both measures of metacognition as well as academic performance.

Correlations of the items on the standardized scale and quarterly grades were positive, but not significant (range = .31 to .37). The online measurement scale and Quantitative MC5 scores also positively correlated at pre-testing (range =.17 to .37) and at post-testing (range = .03 to .22). Results correlating Qualitative MC5 and the scale were more promising. Correlations with the scale and Qualitative MC5 items at pre-testing were again mostly positive (range = -.14 to .61; the correlation of .61 is significant). The same was found at post-testing (range = .04 to .45; the correlation of .45 is significant). The qualitative MC5 item that shows a significant positive correlation with the scale is item 4 ("What are some skills you need to improve on in history class?"), measuring the step of "Evaluating Strengths and Weaknesses".

**Discussion**

Quantitative results from the pilot study are promising and suggests that online measures of metacognition can be developed further using a metacognitive task such as *The Oregon Trail*. While correlations are relatively weak, it is surprising in it of itself to find any correlations with a small n-size of participants and looking at a limited scope of micro-behaviors. A larger sample size is needed to further assess the efficacy of the quantitative measure. Furthermore, qualitative results from the think-aloud protocol still need to be evaluated.

However, given the positive correlations between the online measure using *The Oregon Trail* and academic performance, it appears that unconventional methods of teaching and

learning outside the classroom, including videogames, are effective means of teaching

metacognition (Papastergiou, 2009). Teachers should consider integrating more multimedia

components of learning like videogames to help students realize that thinking and metacognition

are applicable even outside the classroom.

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**Tables**

*Table 1. Summary of Experimental and Control Sessions*

| Session | Experimental Treatment | | | Control Treatment | |
| --- | --- | --- | --- | --- | --- |
| | Lesson | Activity | Goal | 6th Grade Lesson/Activity | 8th Grade Lesson/Activity |
| 1 | Introduction to the 5-step model | Tower Building Activity | All metacognitive steps (overview) | Introduction/Discussion about transitions and high school freedoms/emotions. | Introduction/ Discussion about future job professions |
| 2 | Fixed vs. Fluid Intelligence + Motivation | Students set a goal they can work on in their history class. | Motivational, minor planning activity | Discussion about objective differences and expectations between middle school and high school. | Different types of colleges/Question & Answer Exercise |
| 3 | Instructor guides group discussions linking homework checklist to 5-step model | Homework Checklist, Better Grades YouTube video | Monitoring | Guided discussion on educational variance and various potential school/career pathways. | Discussion on important of college and advantages/ disadvantages |
| 4 (8th grade only) | Instructor guides small group discussions linking activity to 5-step model | Researchers introduce Oregon Trail game to students and practice game with them. Match steps of thinking process to the 5-step model.<br><br>*Winter Booklet is passed out, which consists of stories for students to analyze others' thinking processes and playing Oregon Trail 3 times tied to 5-step model (with follow up questions) | All metacognitive steps | Discussion about employment and popular career fields and interests/Presentation with job descriptions. | Introduce the Oregon Trail game as a fun activity that involves a lot of different careers and interests.<br><br>Show the students how to play the Oregon Trail game and after have them each do a practice round so they get comfortable with it.<br><br>*Give them Winter Booklet instructions on needing to play Oregon Trail 3 times during that period, once for each different occupation option, and answer follow up questions. |

| Session | Experimental Treatment | | | Control Treatment | |
|---|---|---|---|---|---|
| | Lesson | Activity | Goal | 6th Grade Lesson/Activity | 8th Grade Lesson/Activity |
| 5 | Winter Booklet review | Discussion about the Winter Booklet and what makes learning hardest. Students share their Oregon Trail strategies from their Winter Booklet while one researcher takes students outside to do Think-Alouds. | All metacognitive strategies but mostly reflect/adjust | Discussion on academic skills related to various educational niches and what student passions are related to academic fields. | Poll on where students want to go to college, class stats, and celebrities who went to college. Oregon Trail index cards collected. |
| 6 | Writing techniques and clips of video animating the writing process | Discussion about writing process and different strategies that can be utilized. | Applying strategies and planning | Discussion about shifting interests and how students may have to try out a slew of jobs before finding their desired vocation. | Discussion on picking a college properly and what students hope to accomplish there. |
| 7 (8th grade only) | CT Inventions Research Paper Organizer | Students complete an organizer with sections for students to write the due date of the paper, the facts they already knew about the topic, and steps that needed to be completed for the assignment. | Planning, assessing the task | N/A | Application Process/ Discussion on what students don't understand about it. |
| 8 | Review of strategies, study skills, and 5-step model | Jeopardy Review Game | All metacognitive steps | N/A | Back to celebrities, Colleges, and Wrap up |

*Table 2. Correlations among all Metacognition Measures, Motivational Measures, and Quarter*

*1 through 3 Grades*

| Measures | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-Intervention | | | | | | | | | | | | | | |
| 1. Quant. MC5 | | | | | | | | | | | | | | |
| 2. Qual. MC5 | .30*** | | | | | | | | | | | | | |
| 3. Self-Efficacy | .63*** | .22** | | | | | | | | | | | | |
| 4. Achievement Values | .53*** | .19* | .47*** | | | | | | | | | | | |
| 5. Engagement | .70*** | .29** | .61*** | .56*** | | | | | | | | | | |
| 6. Anxiety | -.21* | .11 | -.18* | .06 | -.24** | | | | | | | | | |
| Post-Intervention | | | | | | | | | | | | | | |
| 7. Quant. MC5 | .74*** | .29** | .56*** | .53*** | .69*** | -.11 | | | | | | | | |
| 8. Qual. MC5 | .31*** | .49*** | .23** | .22** | .25** | .11 | .38*** | | | | | | | |
| 9. Self-Efficacy | .41*** | .16 | .69*** | .40*** | .56*** | -.22** | .60*** | .29*** | | | | | | |
| 10. Achievement Values | .33*** | .26** | .23** | .69*** | .49*** | -.01 | .51*** | .33*** | .42*** | | | | | |
| 11. Engagement | .58*** | .30*** | .52*** | .52*** | .80*** | -.27** | .73*** | .35*** | .61*** | .56*** | | | | |
| 12. Anxiety | -.16 | .11 | -.17* | .01 | -.20* | .66*** | -.00 | .17* | -.06 | -.02 | -.22** | | | |
| Grades | | | | | | | | | | | | | | |
| 13. Q1 | .41*** | .33*** | .49*** | .19* | .46*** | -.09 | .47*** | .38*** | .48*** | .11 | .48*** | -.01 | | |
| 14. Q2 | .43*** | .28*** | .54*** | .24** | .51*** | -.13 | .51*** | .41*** | .56*** | .21* | .55*** | -.12 | .84*** | |
| 15. Q3 | .39*** | .27*** | .48*** | .21* | .43*** | -.06 | .46*** | .40*** | .50*** | .17* | .48*** | -.02 | .80*** | .88*** |

Note: N's range from 139 to 148. Quant. = Quantitative; Qual. = Qualitative; MC5 = Metacognition 5; Q = Quarter Marking Period.

*** Correlation is significant at the .001 level (2-tailed).

** Correlation is significant at the .01 level (2-tailed).

 * Correlation is significant at the .05 level (2-tailed).

*Table 3. Effects of Grade by Time by Condition on Quantitative MC5*

| Time | Experimental ($N = 72$) | | Control ($N = 68$) | |
|---|---|---|---|---|
| | *M* | *SE* | *M* | *SE* |
| Pre-Testing | | | | |
| 6th Grade | 3.75 | 0.10 | 3.62 | 0.10 |
| 8th Grade | 3.33 | 0.08 | 3.41 | 0.08 |
| Post-Testing | | | | |
| 6th Grade | 3.79 | 0.10 | 3.58 | 0.10 |
| 8th Grade | 3.53 | 0.08 | 3.48 | 0.09 |

*Table 4. Descriptive Statistics for Separate Steps in the Quantitative MC5*

| Step | *M* | *SE* | *95% CI* |
|---|---|---|---|
| Assess the Task | | | |
| 6th Grade | 3.92 | 0.07 | (3.78, 4.06) |
| 8th Grade | 3.63 | 0.06 | (3.52, 3.75) |
| Evaluate Strengths/Weaknesses | | | |
| 6th Grade | 3.62 | 0.07 | (3.48, 3.76) |
| 8th Grade | 3.39 | 0.06 | (3.27, 3.51) |
| Plan | | | |
| 6th Grade | 3.50 | 0.08 | (3.36, 3.65) |
| 8th Grade | 3.08 | 0.06 | (2.96, 3.21) |
| Apply Strategies/Monitor Performance | | | |
| 6th Grade | 3.50 | 0.08 | (3.34, 3.66) |
| 8th Grade | 3.36 | 0.07 | (3.23, 3.49) |
| Reflect and Adjust | | | |
| 6th Grade | 3.89 | 0.09 | (3.71, 4.06) |
| 8th Grade | 3.72 | 0.07 | (3.57, 3.86) |

*Table 5. Effects of Time and Condition on Qualitative MC5*

| Time | Experimental ($N = 71$) | | Control ($N = 68$) | |
|---|---|---|---|---|
| | *M* | *SE* | *M* | *SE* |
| Pre-Testing | | | | |
| 6th Grade | 1.98 | .06 | 1.93 | .06 |
| 8th Grade | 2.10 | .05 | 2.02 | .05 |
| Post-Testing | | | | |
| 6th Grade | 2.19 | .07 | 1.93 | .07 |
| 8th Grade | 2.08 | .06 | 2.04 | .06 |

*Table 6. Descriptive Statistics for the Effects of Motivational Variables by Grade Level*

| Motivational Variable | 6th Grade ($N = 57$) | | 8th Grade ($N = 83$) | |
|---|---|---|---|---|
| | $M$ | $SD$ | $M$ | $SD$ |
| Self-Efficacy | 5.61 | 0.13 | 5.15 | 0.11 |
| Achievement Values | 4.97 | 0.17 | 4.83 | 0.14 |
| E vs. D Overall | 3.30 | 0.05 | 2.98 | 0.04 |
| Anxiety | 3.69 | 0.16 | 4.28 | 0.13 |

*Table 7. Descriptive Statistics for 6th and 8th Grade Students' Quarterly Grades*

| Time | Experimental (N = 72) | | Control (N = 74) | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| First Quarter | | | | |
| 6th | 90.59 | 6.10 | 91.07 | 7.70 |
| 8th | 86.58 | 11.04 | 84.64 | 12.69 |
| Second Quarter | | | | |
| 6th | 88.03 | 7.52 | 88.20 | 7.67 |
| 8th | 78.65 | 14.06 | 79.77 | 13.58 |
| Third Quarter | | | | |
| 6th | 89.72 | 7.23 | 88.63 | 10.62 |
| 8th | 79.70 | 15.28 | 81.73 | 13.65 |

**Figures**

*Figure 1. Effects of Time and Condition on Quantitative MC5*
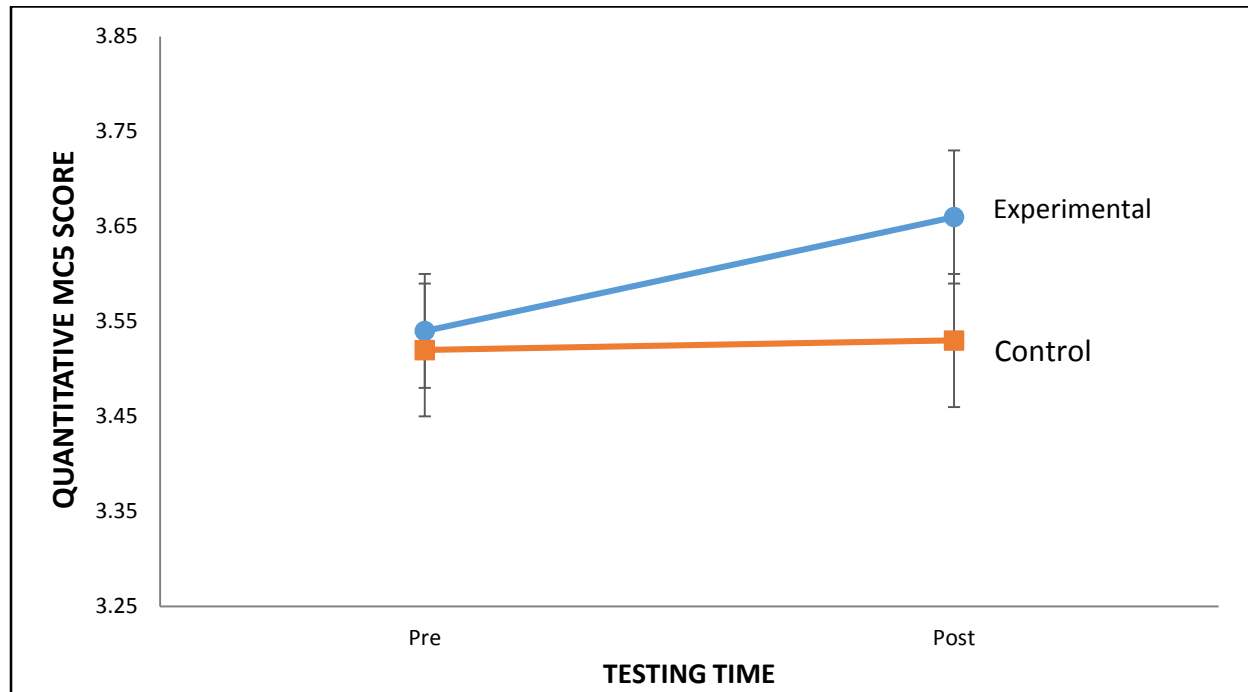
*Figure 2. Effects of Time and Condition on Quantitative MC5*
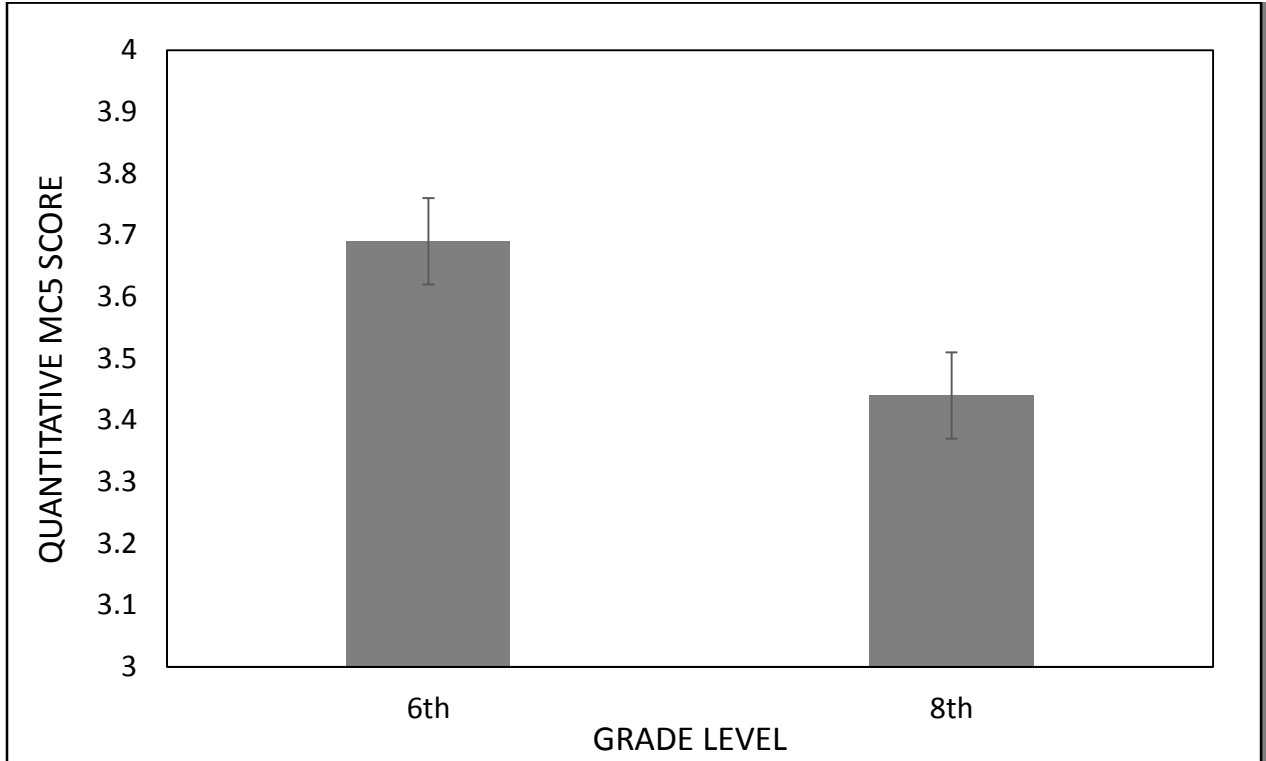
*Figure 3. Effects of Time and Grade on Quantitative MC5*
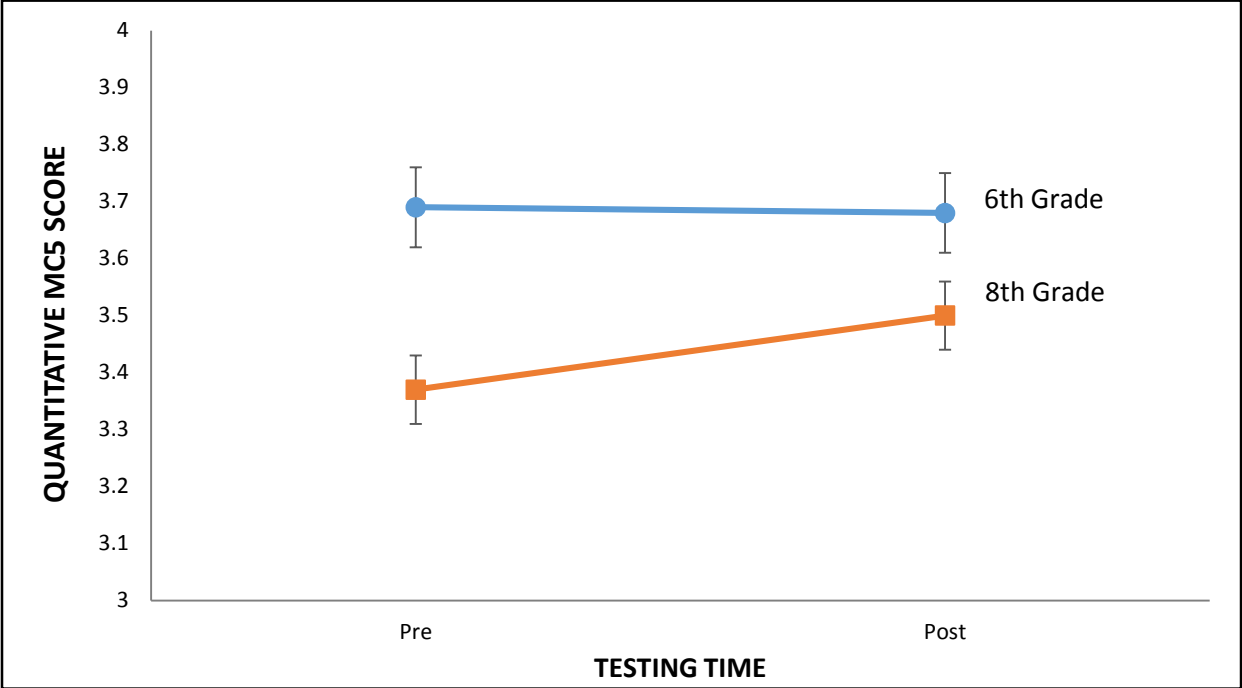
*Figure 4. Quantitative MC5 Step Differences*
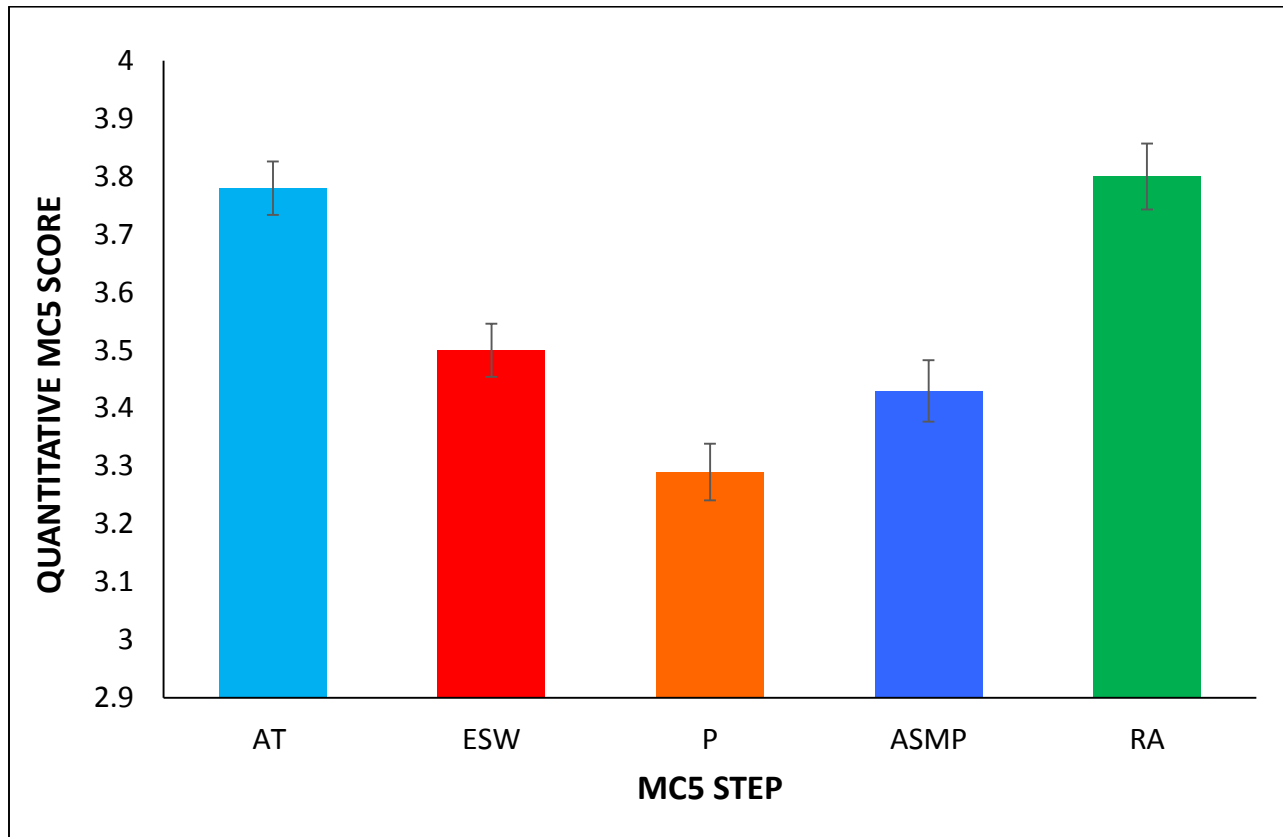
*Figure 5. Effects of Time and Condition on Qualitative MC5*
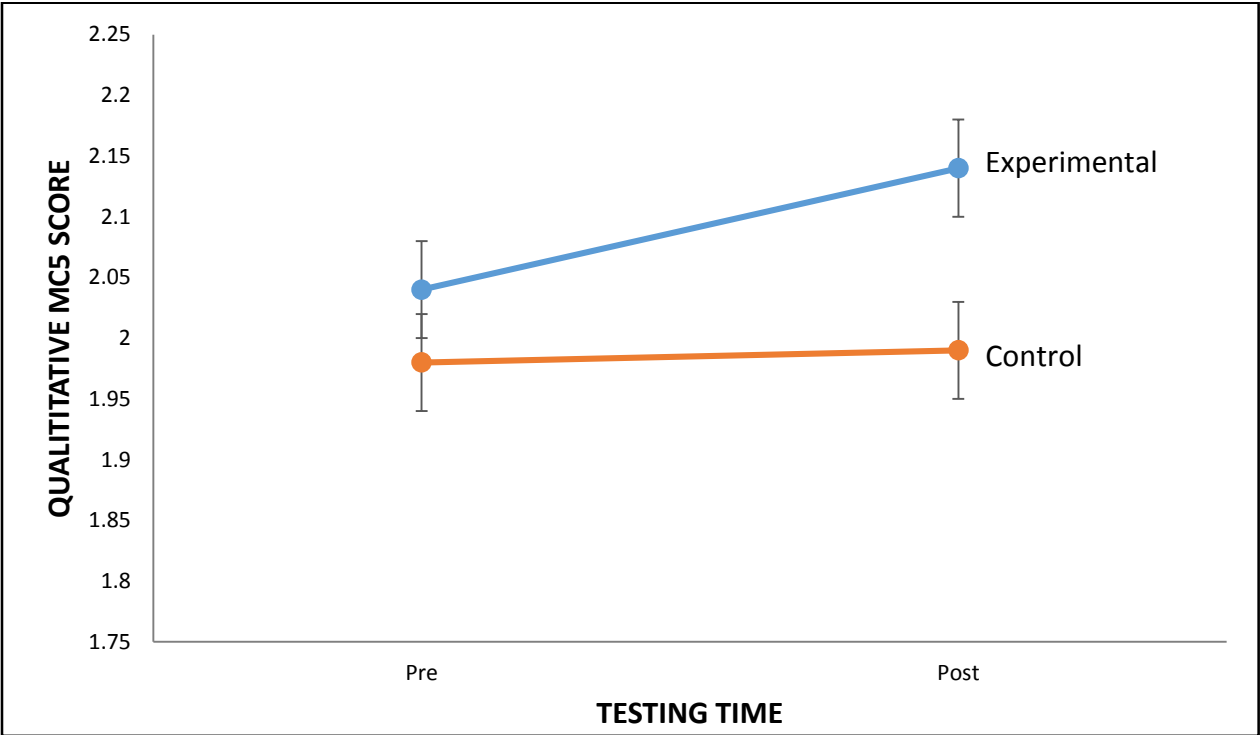
*Figure 6. Qualitative MC5 Step Differences*
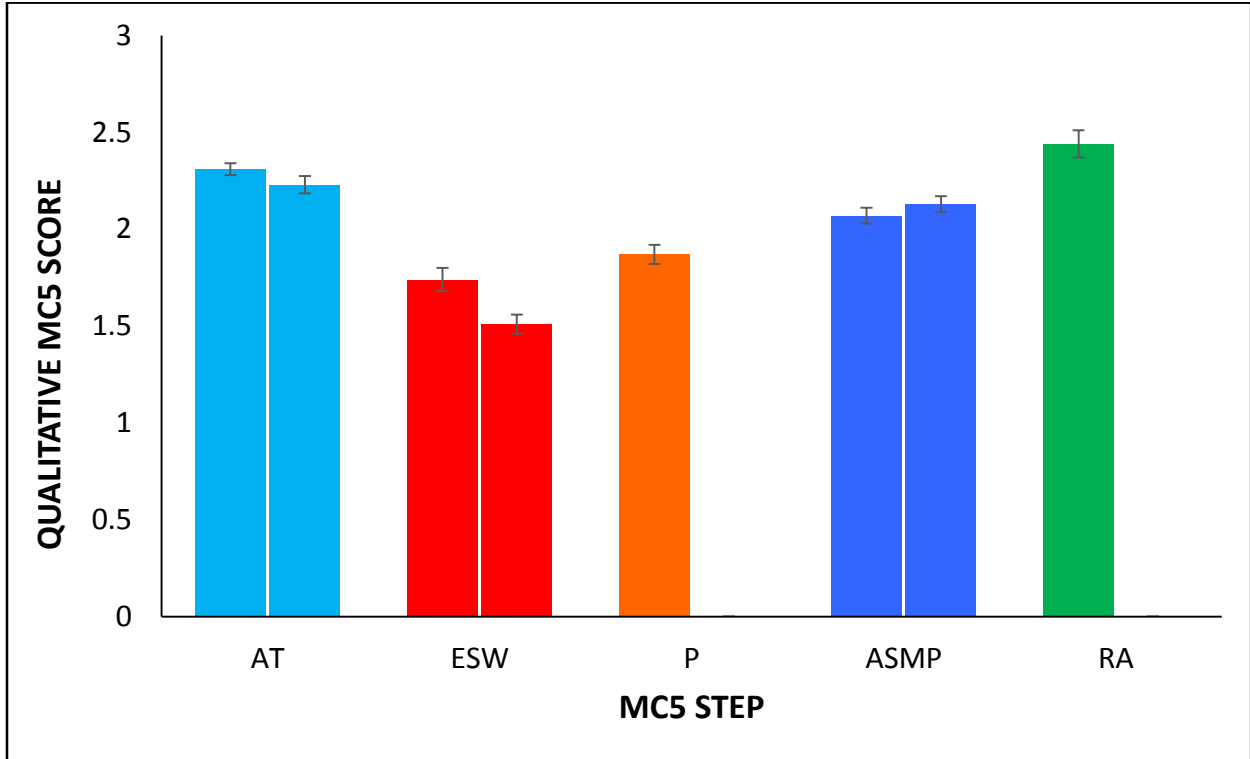
*Figure 7. Qualitative MC5 Step Difference Between Grade Levels*
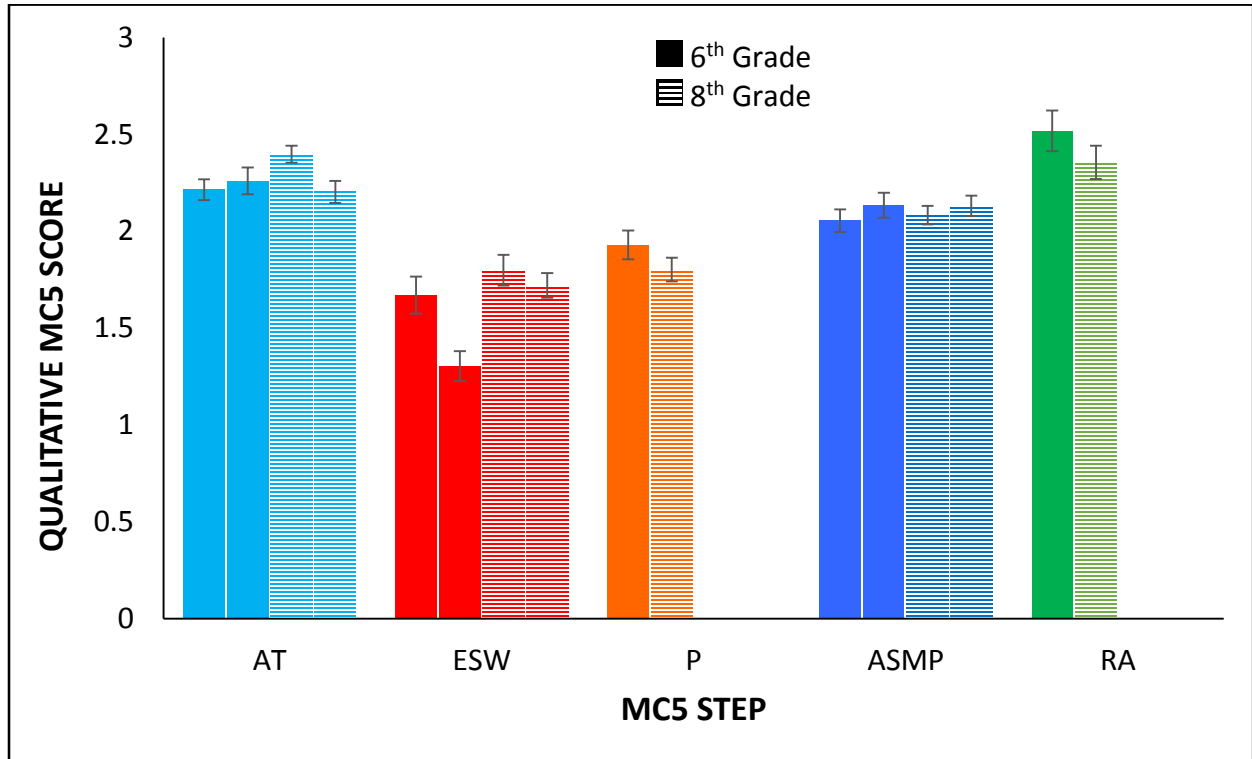
*Figure 8. Effects of Time, Condition, and Grade on Qualitative MC5*
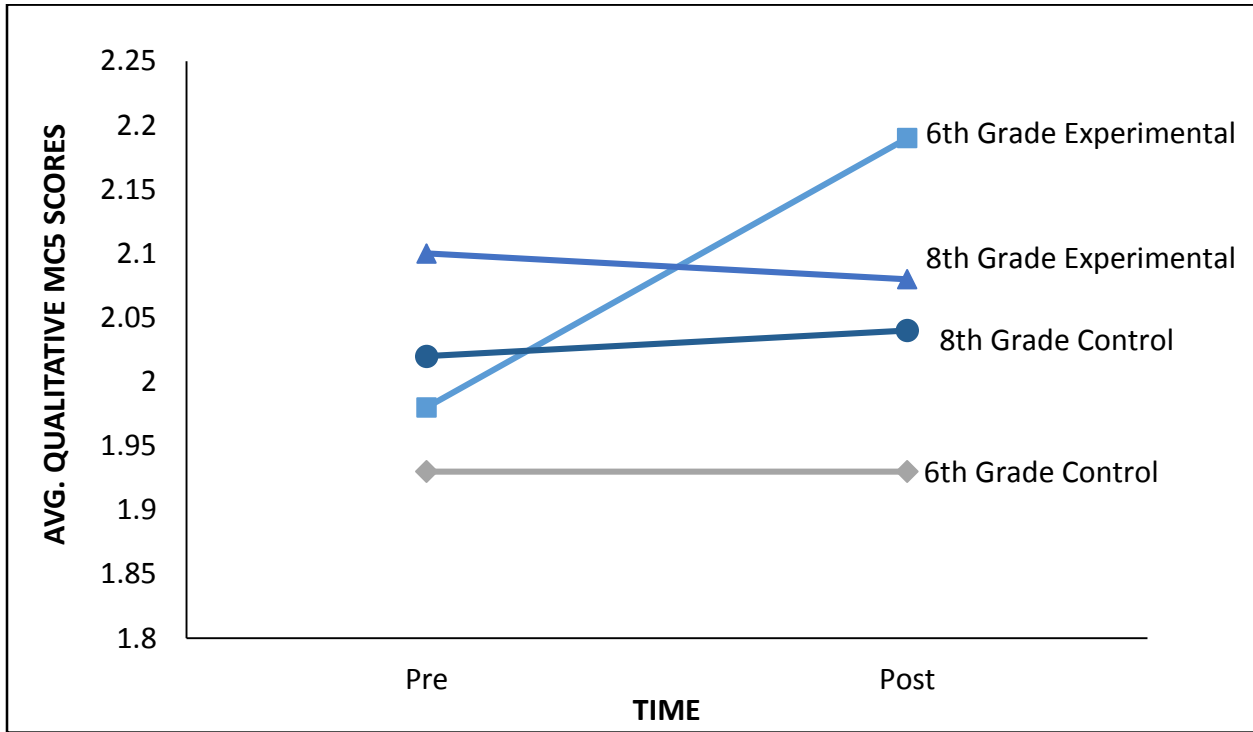
*Figure 9. Effect of Time on Teacher Ratings of Metacognition*
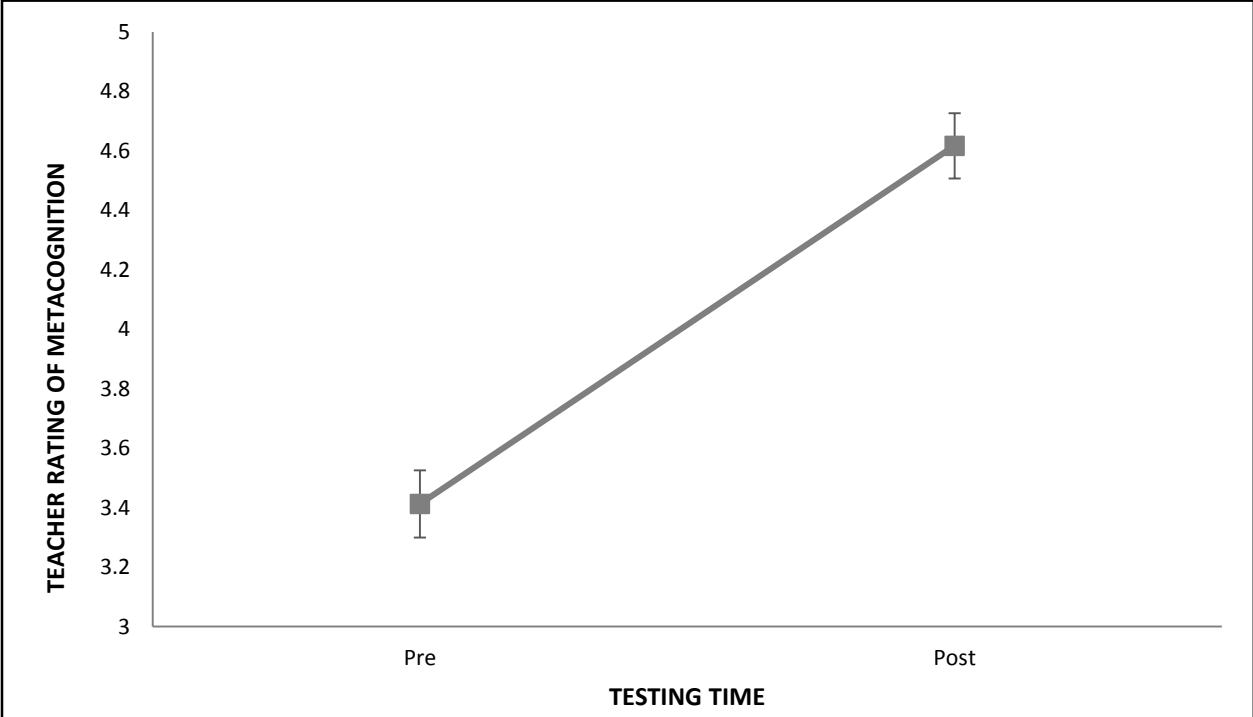
*Figure 10. Descriptive Statistics for 6th and 8th Grade Students' Quarterly Grades*
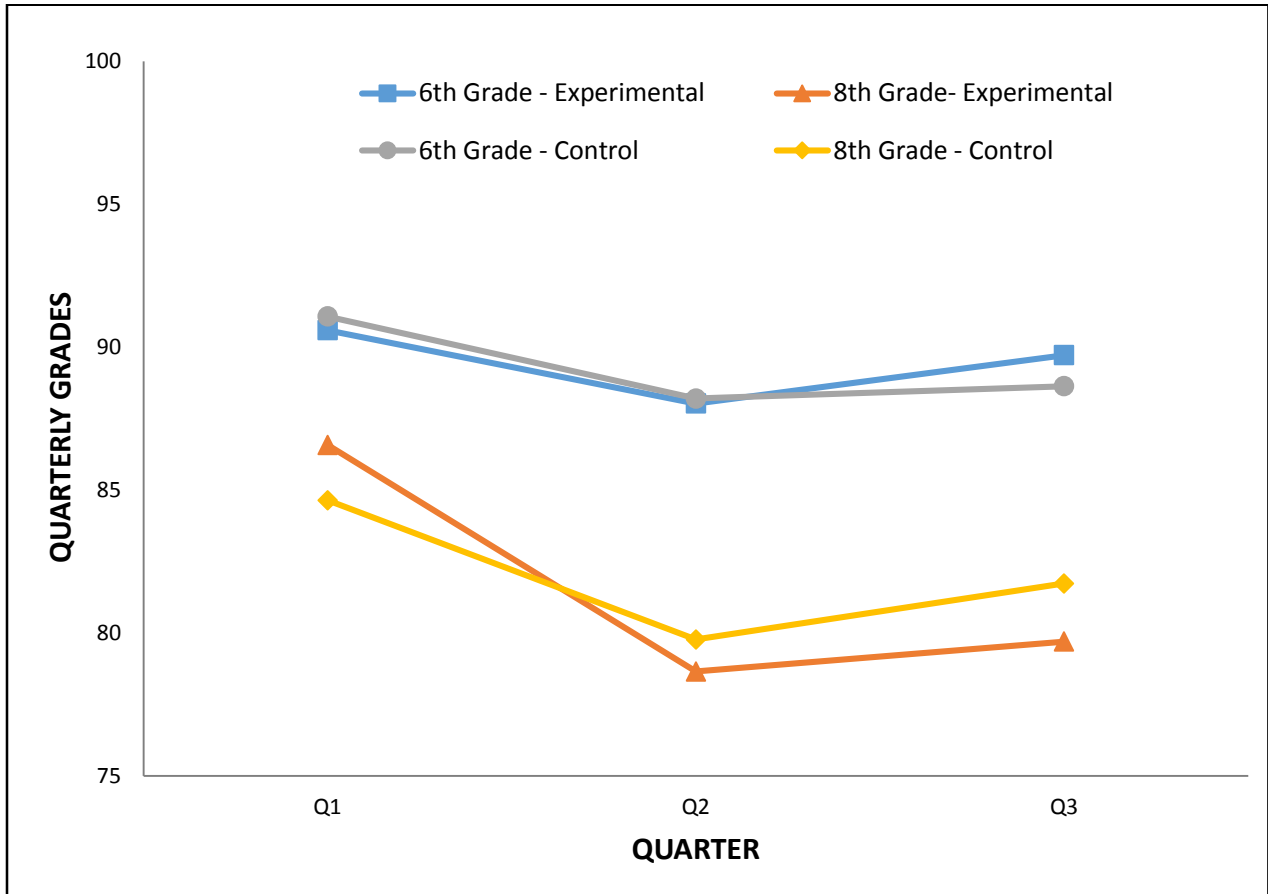
*Figure 11. Effects of Time and Grade Level on Academic Performance*
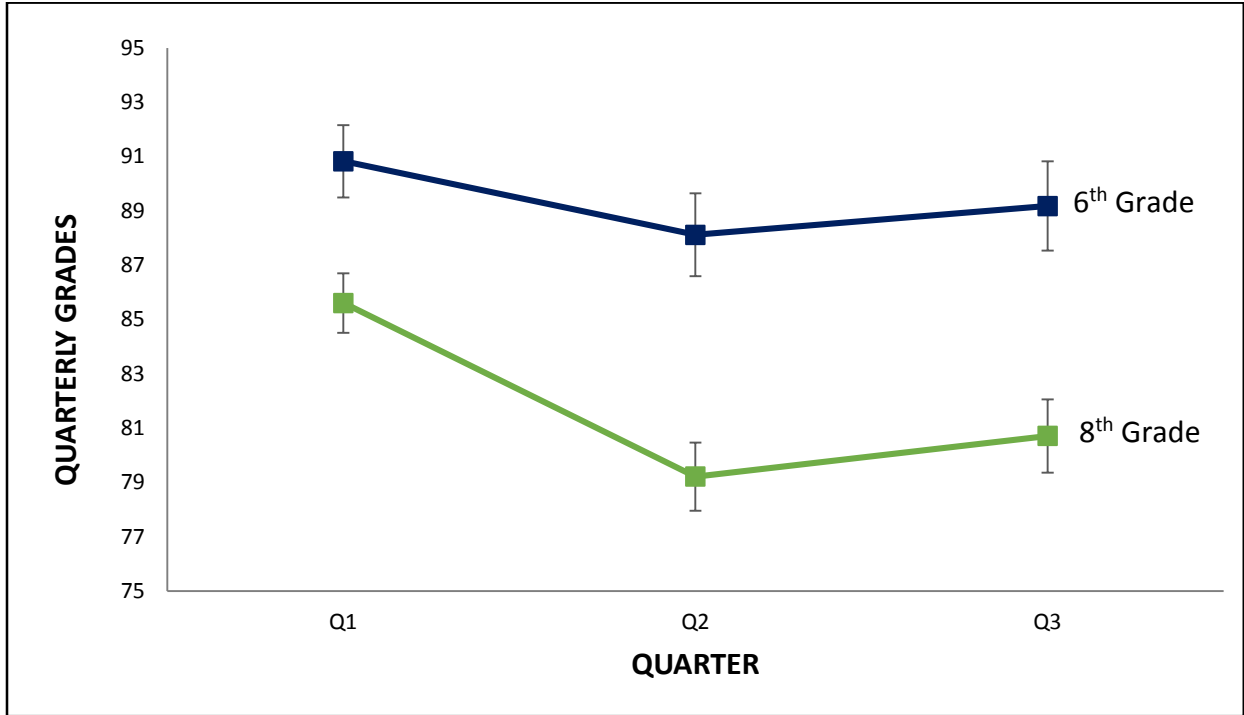
*Figure 12. Effect of Grade Level on Self-Efficacy*
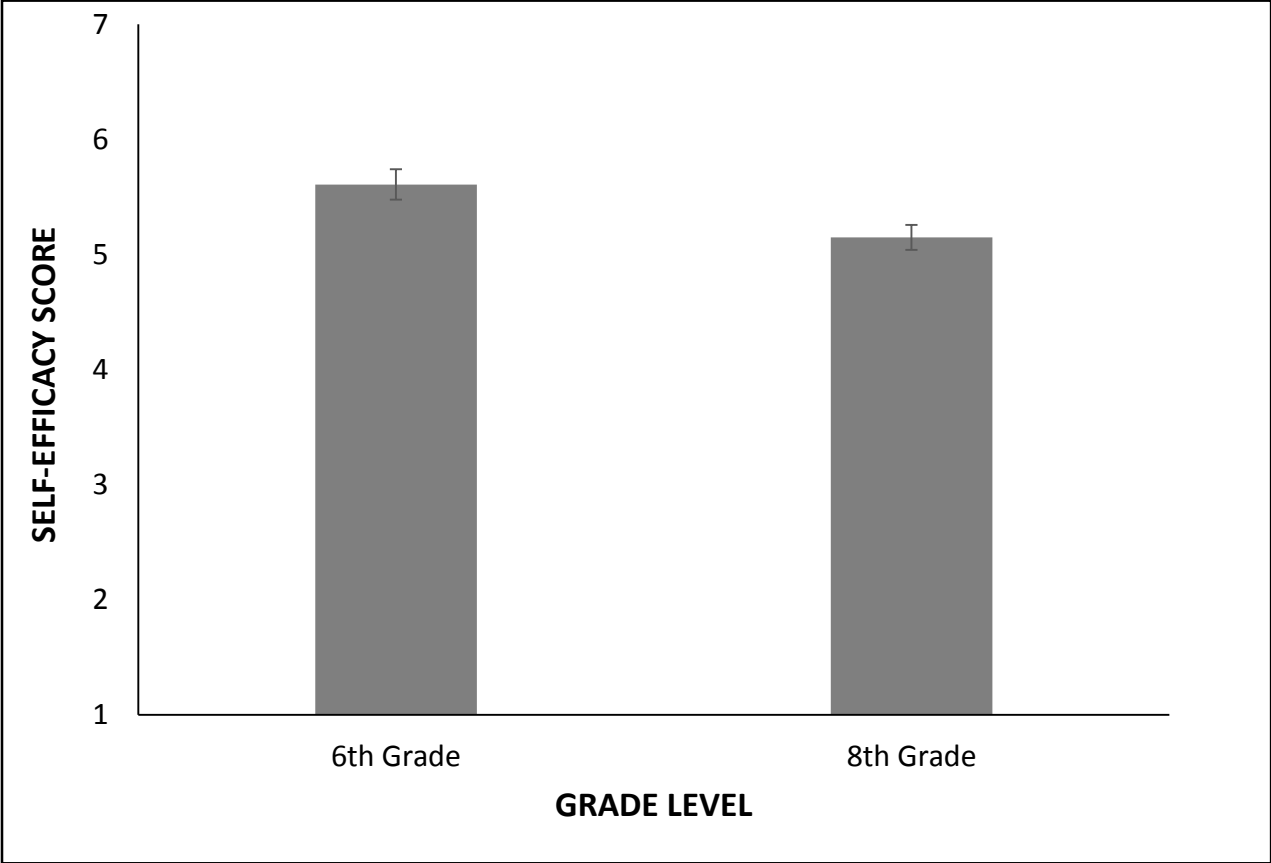
*Figure 13. Effect of Grade Level on Overall Engagement*
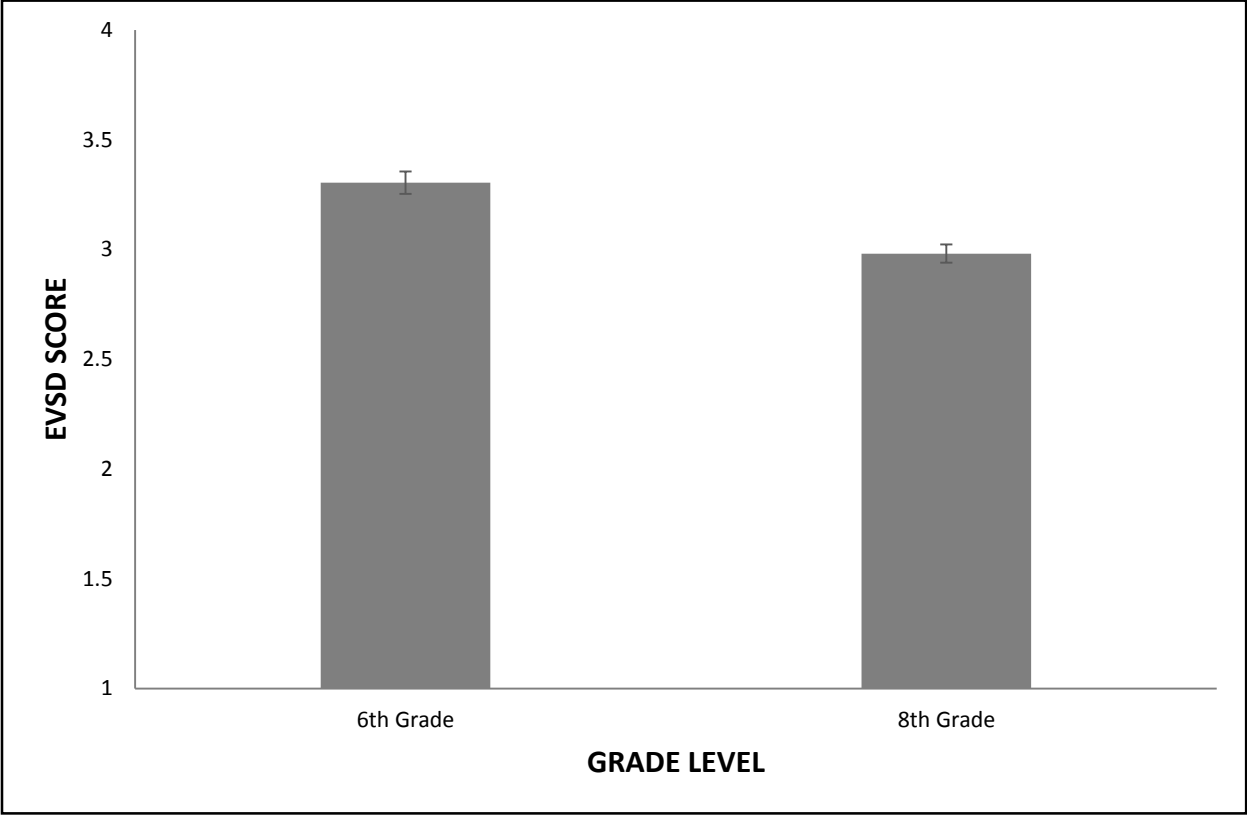
*Figure 14. Effect of Grade Level on Test Anxiety*
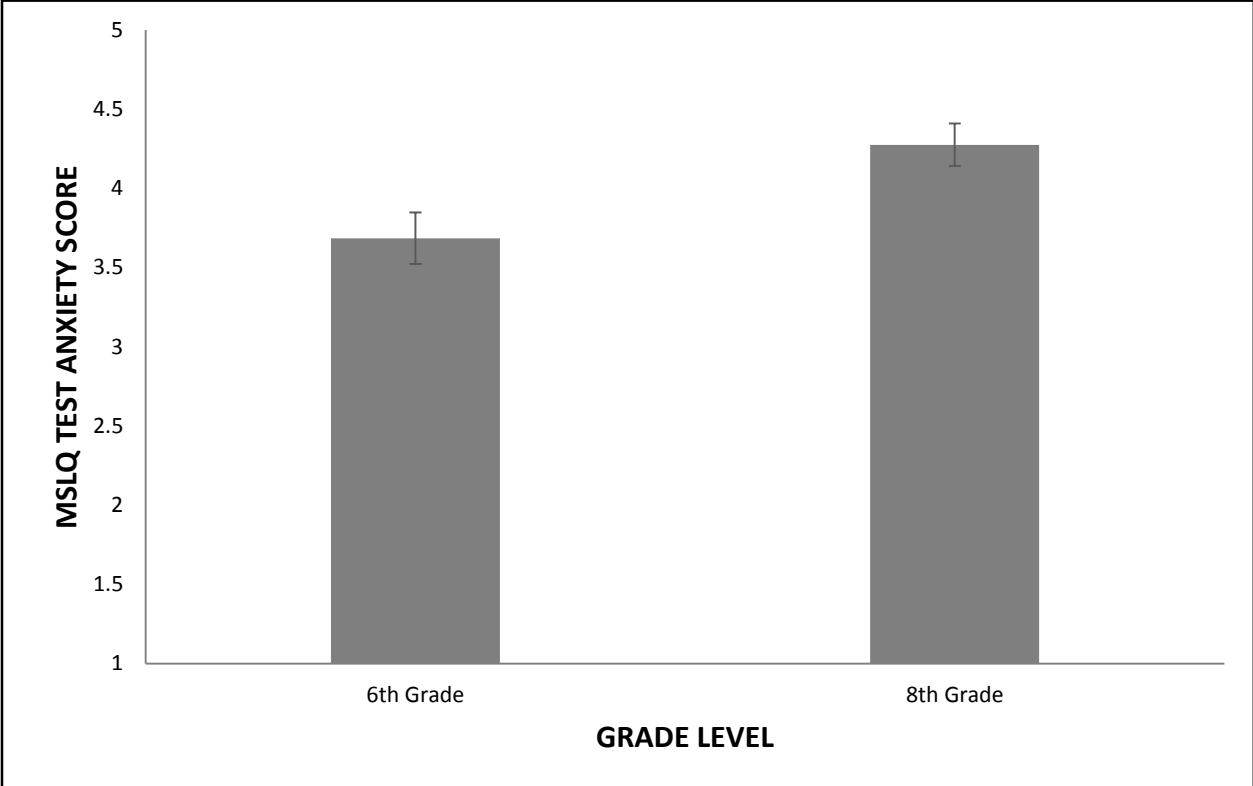
**Appendices**

**Appendix A**

**HARTFORD Public Schools**
CHOOSE. ACHIEVE. SUCCEED.

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

**Trinity College**
*Hartford, Connecticut*

Dear Parent/Guardian,

As part of the Learning Corridor partnership and our relationship with Trinity College we have been invited to participate in a promising ongoing research project. The students in my class will be learning about strategies that may help improve academic motivation. The study, *Self-Regulated Learning in 8th Grade Social Studies*, is designed to measure students' motivational beliefs and ways in which students self-regulate their learning.

During the 2nd marking period students will answer questions about their learning styles, learn effective study techniques, and engage in small group activities to stimulate learning. We anticipate the project will take approximately 4-5 hours (typically 20-30 minute sessions) spread out over the duration of one marking period. Trinity Professors Dina Anselmi and David Reuman will be overseeing the project. The classroom activities will be conducted by Trinity students under my direct supervision.

If you have any questions or concerns regarding this exciting opportunity, please feel free to contact me (860-695-7226) 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:          *Self-Regulated Learning in 8th Grade Social Studies*

Principal Investigators:   Dina Anselmi, Ph.D. (860) 297-2236 or Dina.Anselmi@trincoll.edu
                           Department of Psychology, Trinity College, Hartford, CT 06106

                           David Reuman, Ph.D. (860) 297-2341 or David.Reuman@trincoll.edu
                           Department of Psychology, Trinity College, Hartford, CT 06106

                           Deb Avery davery@hartfordschools.org
                           Hartford Magnet Middle School, Hartford, CT 06106

I acknowledge that I have received and read a letter explaining the *Self-Regulated Learning in 8th Grade Social Studies* study. I understand that there are no known risks to participants in the study, that my 8th grade 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 8th grade son / daughter to participate.
☐ I do not grant permission for my child to participate.

_____          _____
Print Your 8th grade Son's / Daughter's Name          Print Your Name

_____          _____
Your Son's / Daughter's Signature          Your Signature

**Appendix B**

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

Dear Parent/Guardian,

As you already know, we have been invited to participate in a promising ongoing research project proctored by faculty and students at Trinity College. The students in my class will be learning about strategies that may help improve academic motivation. The study, *Self-Regulated Learning in 8th Grade Social Studies*, is designed to measure students' motivational beliefs and ways in which students self-regulate their learning.

In addition to the general experimental design, your child has been selected to join a subset of students who will be asked to answer questions related to their thought processes during an educational game that all of the students will play.  Accordingly, they will be audio-video recorded initially, but once the answers are transcribed and assigned to their confidential ID numbers, the recordings will be destroyed.

If you have any questions or concerns regarding this exciting opportunity, please feel free to contact me (860-695-7226) 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 specific aspect of the larger study that you have already consented to.

Sincerely, Ms. Avery

Title of Project:                 *Self-Regulated Learning in 8th Grade Social Studies*

Principal Investigators:          Dina Anselmi, Ph.D. (860) 297-2236 or Dina.Anselmi@trincoll.edu
                                  Department of Psychology, Trinity College, Hartford, CT 06106

                                  David Reuman, Ph.D. (860) 297-2341 or David.Reuman@trincoll.edu
                                  Department of Psychology, Trinity College, Hartford, CT  06106

                                  Deb Avery davery@hartfordschools.org
                                  Hartford Magnet Middle School, Hartford, CT  06106

I acknowledge that I have received and read a letter explaining this specific student assignment within the *Self-Regulated Learning in 8th Grade Social Studies* study and will be the subject of audio-visual recording.  I understand that there are no known risks to participants in the study, that my 8th grade 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 8th grade son / daughter to participate.
☐ I do not grant permission for my child to participate.

_____          _____
Print Your 8th grade Son's / Daughter's Name          Print Your Name

_____          _____
Your Son's / Daughter's Signature          Your Signature

**Appendix C**

*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?

_____

**Appendix D**

*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 when doing work for class. Please answer as honestly as possible.*
*Your teacher may see some of your answers.*

---

1.  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 |

2.  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 |

3.  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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

5.  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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

7. 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 |

8. 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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

11. 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 |

12. 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 |

13. 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 |

14. 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 |

15. I ask my teacher for help.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **NEVER** | **RARELY** | **SOMETIMES** | **OFTEN** | **ALWAYS** |

16. 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** |

17. When I get a bad grade in this class, I do not study any differently for the next assignment.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **NEVER** | **RARELY** | **SOMETIMES** | **OFTEN** | **ALWAYS** |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **NEVER** | **RARELY** | **SOMETIMES** | **OFTEN** | **ALWAYS** |

19. I understand directions for assignments in this class.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **NEVER** | **RARELY** | **SOMETIMES** | **OFTEN** | **ALWAYS** |

20. 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** |

21. My grades on assignments in this class are different from what I expect them to be.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **NEVER** | **RARELY** | **SOMETIMES** | **OFTEN** | **ALWAYS** |

22. 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** |

23. 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** |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

25. I compare my most recent grades 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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

27. When my teacher returns a test, I try to figure out what I didn't understand.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

28. 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 |

29. 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 |

30. 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 |

31. 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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

33. 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 |

34. 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 |

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

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| NEVER | RARELY | SOMETIMES | OFTEN | ALWAYS |

**Appendix E**

*Self-Efficacy*

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

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

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

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

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

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

39. Compared to others in this class, I think I'm a good student.

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

40. 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 TRUE OF ME** | | | | | | **VERY TRUE OF ME** |

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

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

42. My study skills are excellent compared with others in this class.

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

43. Compared with other students in this class I think I know a great deal about the subject.

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

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

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

**Appendix F**

*Achievement Values*

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

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

46. 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 USEFUL** | | | | | | **VERY USEFUL** |

47. For me, being good at history is

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

48. In general, I find working on history assignments

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

49. Would you take more history 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 G**

*Engagement versus Disaffection*

15.  I try hard to do well in school.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

16.  I enjoy learning new things in class.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

17.  When I'm in class, I can't wait for it to be over.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

18.  When we work on something in class, I feel discouraged.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

19.  In class, I do just enough to get by.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

20.  Class is fun.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

21.    In class, I work as hard as I can.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

22.    When I'm in class, I feel bad.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

23.    When I'm in class, I listen very carefully.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

24.    When I'm in class, I feel worried.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

25.    When we work on something in class, I get involved.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

26.    I don't care if I miss class.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

27.    When I'm in class, I think about other things.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

28. When we work on something in class, I feel interested.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

29. Class is not all that fun for me.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

30. When I'm in class, I just act like I'm working.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

31. When I'm in class, I feel good.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

32. When I'm in class, my mind wanders.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

33. I work on other things when I'm in class.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

34. When I'm in class, I participate in class discussions.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

35.     When we work on something in class, I feel bored.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

36.     I don't try very hard at school.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

37.     I pay attention in class.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

38.     When I can't answer a question, I feel frustrated.

| **1** | **2** | **3** | **4** |
|---|---|---|---|
| **NOT AT ALL TRUE** | **NOT VERY TRUE** | **SORT OF TRUE** | **VERY TRUE** |

**Appendix H**

*Test Anxiety*

39.　　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 |

40.　　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 |

41.　　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 |

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

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

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

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

**Appendix I**

---

**SHORT ANSWERS:** *INSTRUCTIONS*

- *Please answer every question in regards to your history class.*
- *Give lots of examples and that there are no right or wrong answers.*
- *Please EXPLAIN your answers when asked to do so.*
- *These answers will not be graded.*

---

1. At the beginning of an assignment or project for your history class, what would you do if you did not understand the directions?

_____

_____

_____

_____

_____

_____

2. Do you usually make sure you understand the purpose of an assignment or project in history class? **(circle one)**

   **YES          NO**

   a)    *Explain why or why not:*

_____

_____

_____

_____

_____

_____

3.     What are some of the skills that you are good at in history class?

_____

_____

_____

_____

_____

_____

4.     What are some skills you need to improve on in history class?

_____

_____

_____

_____

_____

_____

5.     When you have an assignment or project in this class, do you *(check one)*:

⬜  **Plan how you are going to complete it before you start**

⬜  **Immediately begin working on it**

a)  *Explain why you do one or the other:*

_____

_____

_____

_____

_____

_____

6. Which strategies have you used to help yourself in this class? *(Check all that apply)*

☐ **Making study guides**

☐ **Flash cards**

☐ **Taking notes**

☐ **Talking to the teacher**

☐ **Other (please specify)** _____

a) *How have these strategies been helpful to you in this class?*

_____

_____

_____

_____

_____

7. How do you monitor your work progress as you complete a project or assignment? *(Check all that apply)*

☐ **Ask the teacher**

☐ **Talk to my friends**

☐ **Use a grading rubric**

☐ **Check off things on my to-do-list**

☐ **Other (please specify)** _____

b) *How do these help you complete a project or assignment well?*

_____

_____

_____

_____

_____

_____

8.    When you get an assignment back in this class that you did not do well on, or as well
      as you hoped, do you think about what went wrong? **(Check one of the following)**

      ☐  **I don't think about it at all**

      ☐  **I think about it a little**

      ☐  **I think about it until I figure out how I can do better**

   a)  *Explain why you do this:*

_____

_____

_____

_____

_____

_____

**Appendix J**

General Coding Outline

***Coding decisions are based on Ambrose, et al. model in Chapter 7 of <u>How Learning Works</u>.***

0 - student did not assess the dimension or feature addressed by the question; gave no response; gave an inappropriate response

1 - partial explanation or superficial analysis, **just** sufficient to demonstrate metacognitive process

2 - relevant/reasonable complete response

3 - complete response with elaboration or a demonstration of multiple metacognitive strategies with at least one explanation

Metacognition Question

**0 - Student's response did not address a step of metacognition**

- *"Don't use Wikipedia"* or *"You learn about wars"*

- *"Something that I would advise them is to have all of your materials. If you don't have all of your materials, then you don't get a good grade."*
  (common sense strategy with circular explanation)

- *"The civil war research project wasn't that hard. Just make sure to pay attention do your homework so the project won't be as stressful and also put your all into it."*
  (common sense strategy with mindfulness – not metacognitive – explanation)

- *"Make sure to complete everything to the best of your ability. Teachers grade work off of how much effort you put into your work, and not how perfect it is. Always try your best in order to reach your full potential."*
  (motivational recommendation – not metacognitive)

- *"One strategy to release stress is to take a break. For example life if you have an essay to write, take a break in the middle and start again. Also have fun with whatever you are doing"*
  (mindfulness strategy – not metacognitive)

**1 - Student gave a partial response. Student gave ONE metacognitive step, but did not give a sufficient explanation of why the step is beneficial for learning.***

- *"Don't procrastinate"* or *"Use a planner"*
  (planning without elaboration)

- *"Choose good team member and make sure you get your work done or you will fall behind."*
  (planning without sufficient elaboration for learning; explanation is circular)

- *"You have to plan things out. Get a calendar, mark the due date and start planning what you need to do. If you plan everything out it will be less stressful and you might finish earlier. Then you won't have to worry about it anymore."*
  (planning without sufficient elaboration for learning; explanation is circular)

- *"Have your group on the same page. As a group we struggled with that. Some people were like I'll hand in all my stuff this class, while some people were like as long as it's done before we present its fine. Also do your work, this was a huge grade that impacted everything, work a little bit at a time and you'll get there"*
  (teamwork as monitoring performance without sufficient elaboration for learning)

- *"Make sure you know what war you want to do and it's best if you know some type of information about it. However make sure your up to date about your research and bring everything to class because if you don't you'll have to start all over again."*
  ("make sure you know what war you want to do" as a form of assessing the task without elaboration)

- *"When experiencing stress during your work there are many things you can do to help yourself. One thing that I do if I am stuck on a tricky problem and find myself stressing out is just move on and come back to it later, Another option is if you are doing homework or something that doesn't require you to keep working, take a break, go on a short walk, grab a snack, just calm down and take a break"*
  ("just move on and come back to it later" as a form of applying strategies without elaboration related to metacognition)

**2 - Student provided ONE step in the metacognition cycle with an appropriate elaboration, or referred to TWO or more steps but *without* sufficient elaboration.**

- *"Make a plan because it will help you keep organized and allow you to go back and look at your ideas"*

- *"For the Civil War Newscast, make sure you start jobs right away. Do not waste any time because it goes by quick. Print everything you need before you start, like the map. Also make sure everyone in your group is actually doing the work by checking it all at the end of class. Finally practice the presentation because you need to be able to say it all."* (planning and monitoring performance & applying strategies without sufficient elaboration)

- *"I would say don't partner up with someone who you know won't help just cause there your friend and every time you meet up with your group remember to check with your group to see that there doing what they need to do so everyone get a good [grade]"* (assessing strengths & weakness and monitoring performance without sufficient elaboration; explanation is circular)

- *"Manage your time! Don't set yourself up with too much, for instance, my group committed ourselves to filming a real commercial for the project, among everything else, and that fell through the cracks because everyone had other things going on."* (planning with elaboration; detailed example as a form of sufficient elaboration)

- *Try to pretend that you're in a group by yourself, so you won't have to rely on someone to bring stuff in for the project and end up looking crazy for your presentation.* (applying strategies with elaboration)

- *"Don't start it the night before the actual presentation. Edit your work every night"* (planning and reflecting & adjusting without any elaboration)

**3 - Student's response shows a strong understanding of metacognitive steps with at least TWO steps and at least ONE explanation.**

- *"Plan, keep organized, know strengths and weaknesses so each person will get the job most suitable for their strengths."*

- *"Work on the project for about 15 min. every night and don't wait until a week before the project is due to start it. Also it helps to stay in touch and figure out ways of*

*contacting each other during the project. This way you can work together when you are not really together. Take these projects seriously and not as a joke. They really do mean a lot towards your grade now and helpp prepare you for the future. Also study even when you don't have a test coming up. Days when you have free nights just look through your papers a little to help you refresh your mind so when it comes time for a test it will not be too much to handle."*
(planning without elaboration; monitoring performance & applying strategies with elaboration)

- *"A good problem solving strategy to use on projects is to make a plan by writing what you need to get done every day in your agenda. That method will help you move along in your writing and completion of the projects. If it's a group project than assign jobs and check in on them every class to be sure they're done."*
(planning with elaboration; monitoring performance without elaboration)

- *"Really keep on your group members about their jobs. Don't let them forget and do it last minute. Also, use the time in class as best you can. The earlier you can finish the project, the more time you have to make it extra special, and run smoothly."*
(planning without elaboration; applying strategies with elaboration)

- *"The first thing you should do is assign jobs, so everybody knows what their doing, and there is [no] confusion. If you come upon a problem you should use all your available resources (book, computer, teacher, friends, etc)"*
(planning with elaboration; applying strategies without elaboration)

NOTES:

* - Circular explanations are not sufficient explanations for learning.

Ex. *"getting a good/bad grade"; "not failing"; "the project won't turn out well"; "so you won't be stressed"*

- Student provides metacognitive strategy but with a non-metacognitive elaboration (i.e. social, mindfulness) = **1** for the metacognitive strategy

Ex. *"Try to be organized so you won't be stressed*"

**Appendix  K**

*Oregon Trail – Online Measurement / Think-Aloud*

| STUDENT/PARTICIPANT NAME: | |
| --- | --- |
| HISTORY BLOCK: (please write which block the student has history/social studies, not when the testing takes place) | |
| RESEARCHER NAME: | |
| DATE: | TIME: |

***Instructions for the student/participant:*** *"We will be assessing your thinking style while playing* THE OREGON TRAIL. *Play the game as you would normally do so until we stop you to ask questions about your gameplay. You do not have to wait for us to ask these questions for you to continue. Please speak* **loudly and clearly** *when answering questions. There are no right or wrong answers. Please try to explain your answers as completely as possible."*

***Instructions for researcher:*** *Please ask the following questions verbally. For each action the student makes throughout the game, make sure to ask* **WHY** *he/she did something. You* <u>do not</u> *have to write down all of the participant's responses as they will be recorded.* **HOWEVER,** *please try to take notes for questions that have blank spaces/boxes for you to write in.*

---

**BEFORE GAME: Ask the Student…**
1)   How many times have you played *The Oregon Trail*? _____
**START GAME. Set timer for 20 minutes.**

2)   Do you understand how to play the game?

3)   What do you think the end goal of the game is?

4)   What occupation did you pick? _____   Why did you choose that occupation?

5)   What month did you choose to leave? _____   Why did you choose that month?

6)   How many oxen did you buy? Why?          How much food did you buy? Why?
     How how much clothing did you buy? Why? How much ammunition did you buy? Why?
     How many spare parts did you buy? Why?
     ***Follow up:*** **If the student saved some money –** *"Why did you decide to save some of your money?"*

7)   *During a* **River Crossing** *– make sure to ask the student* **why** *they chose the action that they decided on.*

PLEASE TALLY THE FOLLOWING. FOR EACH TIME THE STUDENT DOES ANY OF THE FOLLOWING, BE SURE TO ASK **WHY** (e.g. why did you look at the map? Why did you change your rations? Etc.)

8) How many times did the student choose to SIZE UP THE SITUATION? (including landmark stops)

9) How many times did the student CHECK SUPPLIES?

10) How many times did the student LOOK AT MAP?

11) How many times did the student CHANGE PACE?

12) How many times did the student CHANGE FOOD RATIONS?

13) How many times did the student STOP TO REST?

14) How many times did the student ATTEMPT TO TRADE?
   *Follow up:* **Why did you accept or decline the offer?**

15) How many times did the student TALK TO PEOPLE?

16) How many times did the student GO HUNTING?

17) How many times did the student BUY SUPPLIES? (during landmark stops)

18) Please tally how many times the student encountered **obstacles** (given via notifications) throughout the game. This includes wagon members getting sick/injured, bad weather, getting lost, getting robbed, etc.

19) Number of wagon members dead?



**AFTER GAME.**

20) Does the student make it to the end of the 20 minutes? (please circle one)    **YES      NO**

21) If **only some of your members or none of your members survived**, what do you think you could have done differently to change this outcome?
    If **all of your members survived**, why do you think you were so successful?

22) Overall, would you have made any changes at the beginning of the game if you could?

**Appendix L**
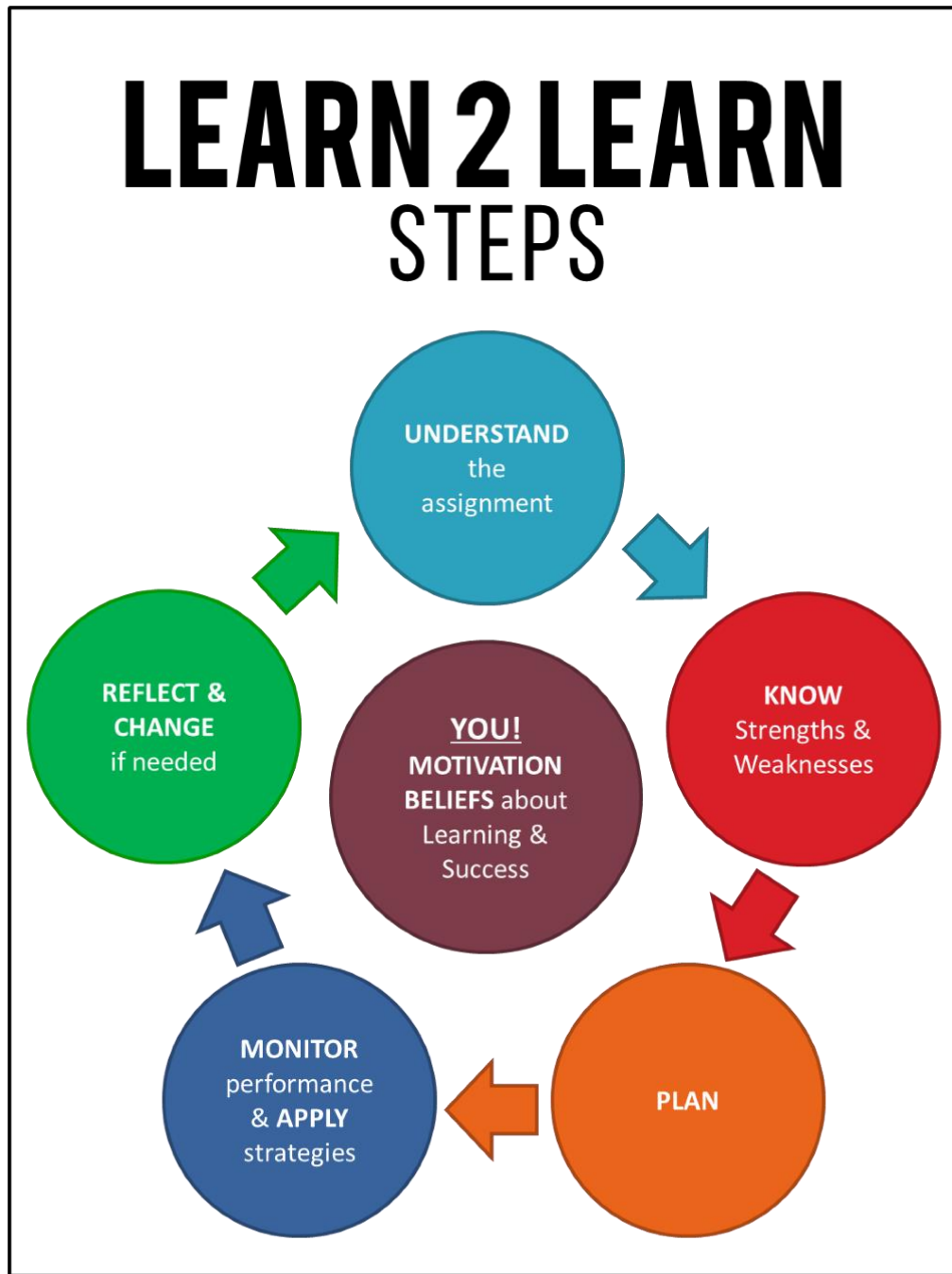
# LEARN 2 LEARN
## STEPS

---

### 1. UNDERSTAND the Assignment
Before you do anything, make sure you know what the assignment is asking you to do.
> Ex. *Ask the teacher questions; Reread directions; Check the rubric*

### 2. KNOW Strengths & Weaknesses
Knowing what you are good at versus what you need to improve on will help you along the way.
> Ex. *Look back on past work (what did you do well on?); Ask for feedback*

### 3. PLAN
Keep yourself organized as you are completing an assignment
> Ex. *Use a planner; Make an outline; Don't procrastinate!*

### 4. MONITOR Performance & APPLY Strategies
Make sure you're checking your progress along the way. Use strategies to help you get further!
> Ex. *Making a rough draft; Go to the library; Practice presentations*

### 5. REFLECT & CHANGE (if needed)
Before turning in your assignment, make sure to double-check your work for any mistakes you might have made.
> Ex. *Proofread your essays; Make edits*

---

### MOTIVATION & BELIEFS about Learning & Success
Believe in yourself! You can learn anything you set your mind to!

**Appendix M**

Session 1

# LEARN 2 LEARN Steps:
## Building a Structure in Groups

Team Name: _____
Members :_____

After building the structure, discuss with your team what you did, thought of, or talked about as a group that would match each one of the *LEARN 2 LEARN Steps*. Make sure you write something for ALL the steps!
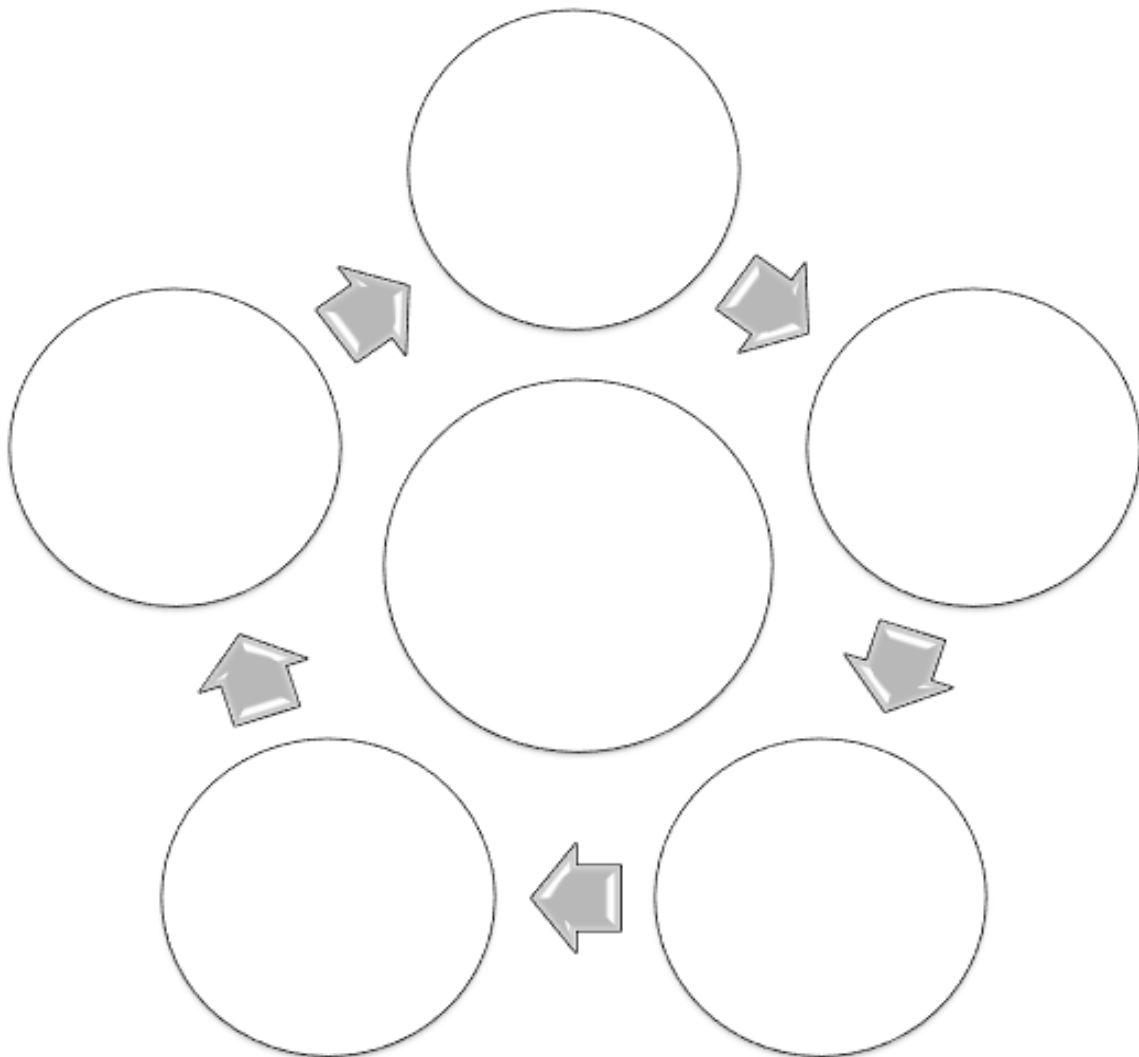
**Appendix N**

Session 2

**LEARN2LEARN** : "I THINK I CAN"

**Session 2: Metacognition & Motivation.** Write down one **GOAL** you would like to achieve in your social studies class, and one **POSITIVE POWER STATEMENT** about yourself, your learning, or your class that will help you keep motivated.

*My Goal is* _____

_____

_____

*My      Power      Statement:*      _____

_____

_____

**Appendix O**

Name:_____ Block: _____ Date:_____

## LEARN2LEARN: ARE YOU LEARNING TO LEARN?

**WARM UP.** Without looking at your notes/model, write down **each of the LEARN 2 LEARN steps** in the empty circles. Then, write down **one example** of each step.

STEP:

EXAMPLE:
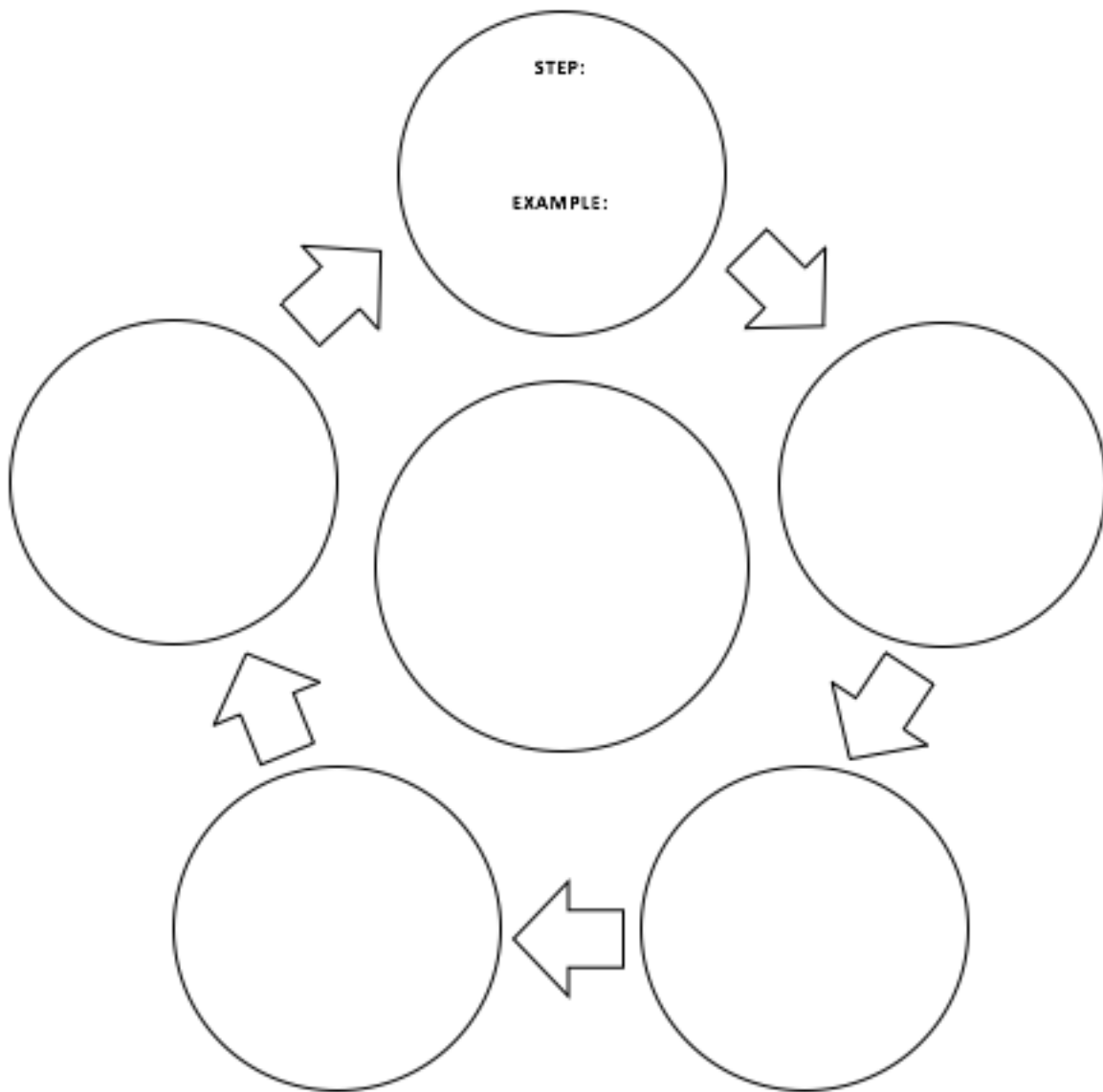
**Appendix P**

Name_____ Block_____ Date_____

**LEARN2LEARN**: HOMEWORK REFLECTION

**Directions:** Before our fourth session next week, please complete the following questions about how you complete your homework assignments in social studies.

**Step 1. Review previous progress.**

Grade on last assignment: _____

Study Strategies used: _____

_____

Time spent preparing: _____

Effort exerted (1 = very little, 5 = very much): _____

**Step 2. Set a new goal & create a plan for meeting the goal.**

Grade desired: _____

Other goals: _____

Strategies I **will** use: _____

_____

Time I **will** spend: _____

Effort I **will** exert (1 = very little, 5 = very much):_____

**Step 3. Monitor my progress.**

Am I following my plan? _____

    *If not, why?* _____

Am I putting in the time & effort that I planned? Explain.

_____

_____

Do I need to make any changes to the plan? Explain.

_____

_____


**Step 4. Assess the outcome.**

Grade I earned: _____

    Did I reach my goals?        **YES**          **NO**

Strategies I used: _____

_____

Time spent completing assignment: _____

Effort exerted (1 = very little, 5 = very much): _____


**Step 5. Look ahead to next time.**

What will I do the same to prepare next time?

_____

What will I do differently next time?

_____

What are my new goals?

_____

**Appendix Q**

Name: _____ Block: _____ Date: _____

# LEARN2LEARN: LEARNING &...VIDEOGAMES?

**DIRECTIONS:** Write down **each of the LEARN 2 LEARN steps** in the empty circles. Try to do it without first looking at your notes. Then, as we play *The Oregon Trail*, write down **one example** of each metacognitive step used to complete the game.

STEP:

EXAMPLE FROM
PLAYING GAME:

YOU! ☺
**Your beliefs about
learning & success** —
in this case, believing
that you *can* win the
game!
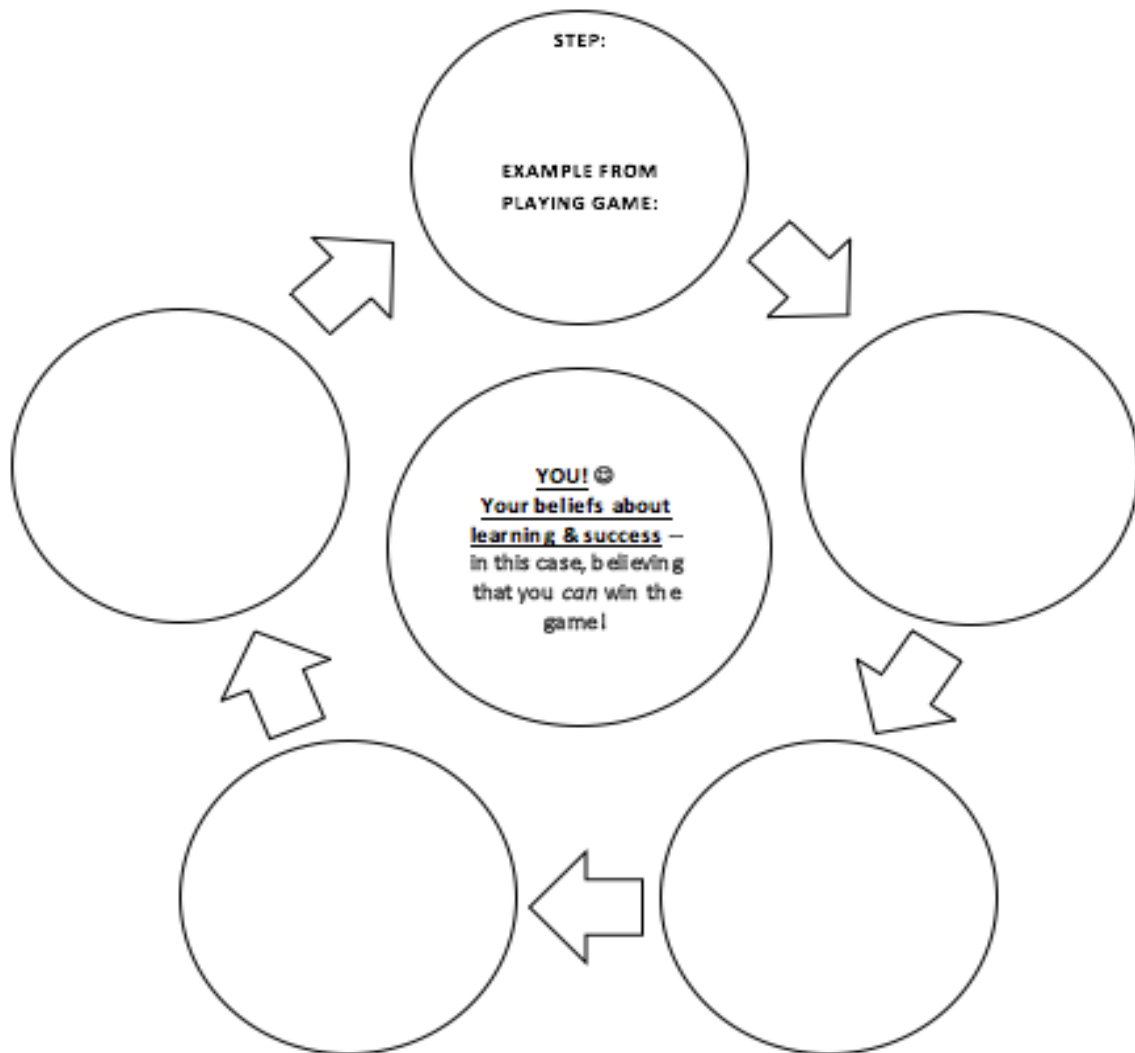
**Appendix R**

# LEARN2LEARN
## WINTER BOOKLET – 6<sup>TH</sup> GRADE
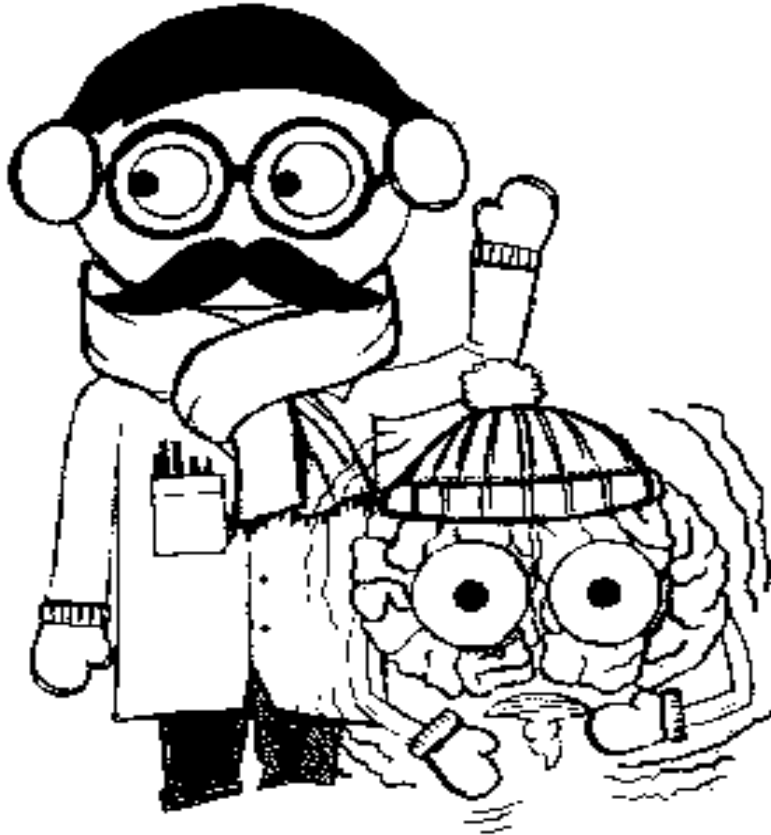
**Name: _____ Block: _____**

Check and date the activities that you have completed:

☐ **Are You Learning to Learn?**
   (Date completed: _____)

☐ **Jesse's History Paper**
   (Date completed: _____)

☐ **Alex's History Paper**
   (Date completed: _____)

☐ **My New Civilization Activity**
   (Date completed: _____)

*COMPLETE YOUR BOOKLET BY JAN. 25TH FOR A SURPRISE REWARD!*

ACTIVITY #1
**ARE YOU LEARNING TO LEARN?**
**DIRECTIONS:**
*First, fill out the empty Learn 2 Learn steps as best as you can without looking at your notes. Afterwards, make sure you have the correct steps in order by checking against your laminated* Learn 2 Learn Model. *Write down* <u>one example</u> *of each step.*

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**What's central to learning to learn?**

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**Did you get them all right the first time? Which steps did you miss at first?**

_____

_____

ACTIVITY #2
**JESSE'S HISTORY PAPER**

**DIRECTIONS:**

*Please read Jesse's story and answer <u>ALL</u> the questions.*

---

Jesse's history professor at Trinity started the class announcing that they were being assigned a paper on the Civil War. Jesse was handed a sheet with directions for the assignment and its due date, which he quickly skimmed while talking to one of his friends. The following week he ran into Alex who was in the same History class. Alex asked Jesse how he was doing with the paper, which he had completely forgotten about. He then realized that the paper was due in one week.

Swamped with assignments for other classes, Jesse had to start working on the paper the day before it was due. Since it was a paper that required a lot of work and research, Jesse had to stay up all night working on it. Doing the research and readings took up a lot of time so he wasn't able to write out an outline for the paper, and had to jump right into the writing. He had a lot of ideas and knew what he wanted to write, but didn't know how to organize it. He was able to write just the right number of pages but was hesitant that he had included everything the professor had asked for. Rushing to finish it on time, he was unable to proofread it before handing it in for a grade.

---

**QUESTIONS:**

1) **Did Jesse use any sort of strategies to help himself complete the assignment efficiently?**

   YES            NO

   a. **If yes, explain what strategies he used…**

   _____

   _____

   _____

**2) Do you think Jesse should have done anything differently? If yes, explain.**

_____

_____

_____

_____

_____

_____

**3) Which steps of the 5-step Learn 2 Learn model did Jesse apply when he was writing his paper? For each step that he used, describe how he did so.**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ACTIVITY #3
**ALEX'S HISTORY PAPER**

**DIRECTIONS:**

*Please read Alex's story and answer <u>ALL</u> the questions.*

---

Alex's history professor at Trinity began class with the announcement that they were being assigned a paper. Alex was handed directions for the paper from his Professor and began to read carefully. He read that the paper would be due in 2 weeks and was on the Civil War. He immediately took out his planner and wrote down when the paper was due.

After class, Alex went back to his room and began to write out a plan for the next two weeks. He knew that he had two other papers and another big project to do before the end of the year and would have to manage his time well. He decided to spend an hour on the paper every day. He first began by doing research on the subject until he was ready to make an outline of everything he planned to write about. After making an outline, he realized his paper was going to be too long and needed to be shortened. He took out some of the information he believed to be irrelevant and started to write the paper. He was done two days early, giving him plenty of time to read the paper over for spelling mistakes before handing it in for a grade.

---

**QUESTIONS:**

1) **Did Alex use any sort of strategies to help himself complete the assignment efficiently?**

    YES          NO

    a. **If yes, explain what strategies he used…**

_____

_____

_____

2) **Do you think Alex should have done anything differently? If yes, explain.**

_____

_____

_____

_____

_____

_____

3) **Which steps of the 5-step Learn 2 Learn model did Alex apply when he was writing his paper? For each step that he used, describe how he did so.**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

## ACTIVITY #4
**MY NEW CIVILIZATION ACTIVITY**

**DIRECTIONS:**

*Imagine you are embarking on a quest to start a new civilization. Please answer ALL of the following questions about your civilization, providing as many examples as possible:*

1) **Where should your civilization be located (mountains, coast, islands, etc.)? Why?**

_____

_____

_____

    a. **List positives and negatives of the location you chose.**

| Positives | Negatives |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**\* WHICH LEARN 2 LEARN STEP(S) DID YOU USE TO ANSWER QUESTION 1?**

_____

2) **Using the empty box below, <u>draw</u> a map of your civilization that shows important natural resources and settlements.**

*Example:* *Your map does not have to be as detailed, but you should include different resources (like water sources, farm lands, etc.) and settlements. Use symbols that make sense to you and add a key on the bottom of your map.*
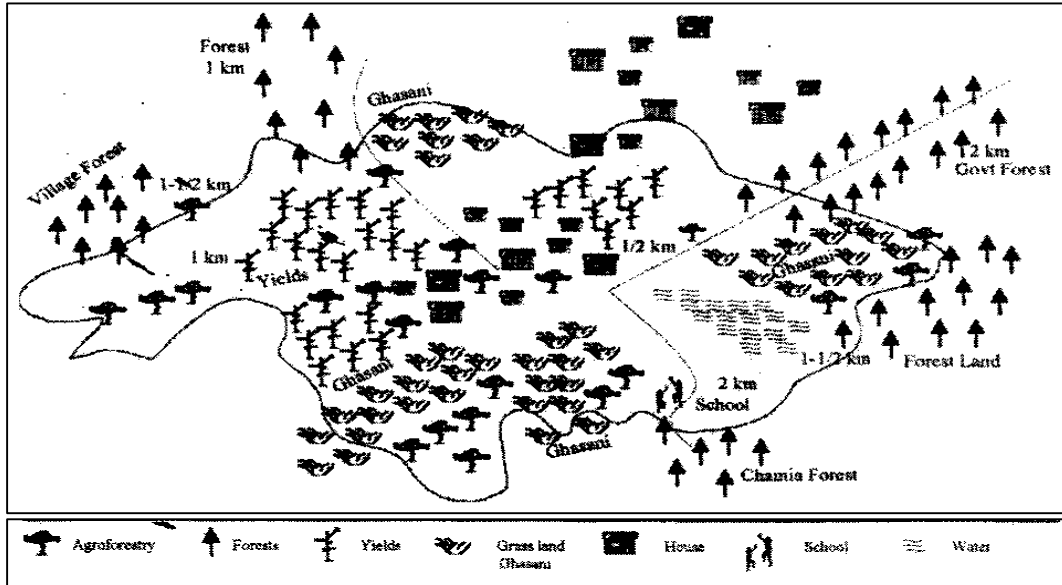


**DRAW YOUR ORIGINAL MAP BELOW.** Keep in mind the location that you chose for Question 1 (ex. draw mountains if you chose to be near mountains).
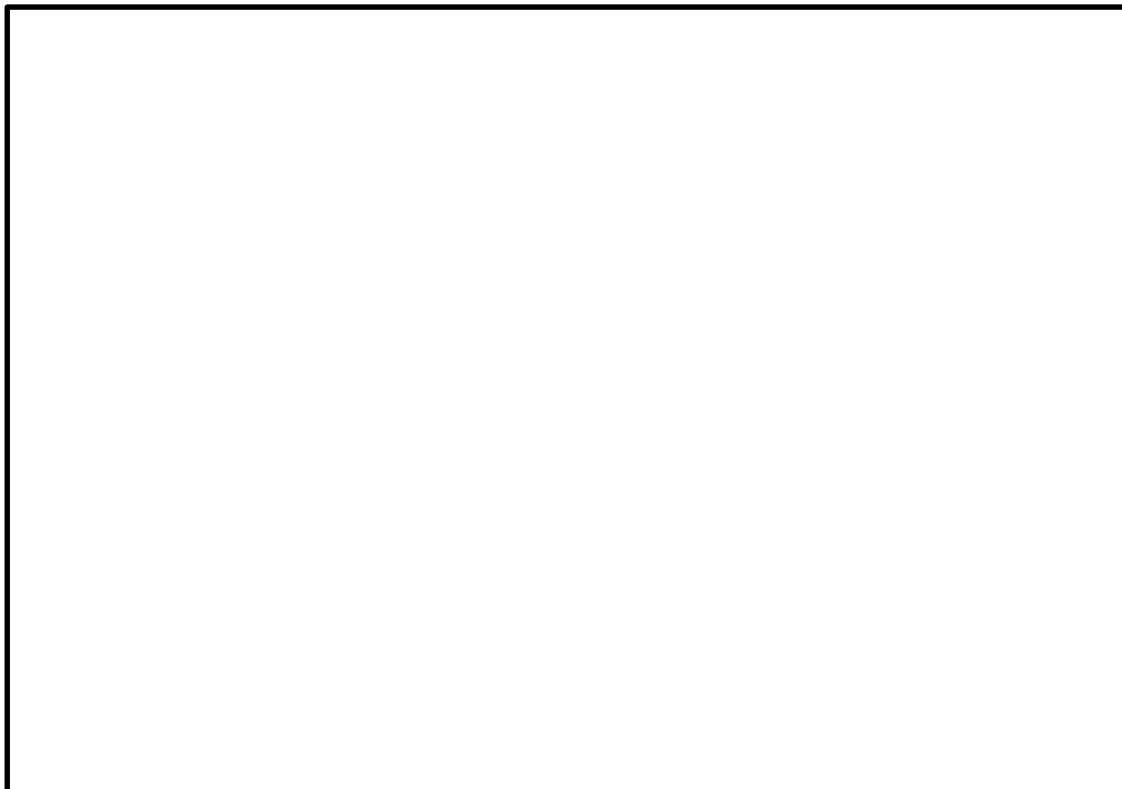
    **a. Explain why you drew the resources or settlements you did.**

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 2?**

_____

**3) What types of food will you try to collect, be it by hunting, gathering, or harvesting? Why? Give examples of these foods.**

_____

_____

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 3?**

_____

**4) What kinds of occupations will your citizens have in your civilizations? Why?**

_____

_____

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 4?**

_____



**5) If your civilization is attacked, how will you have prepared to defend your people?**

_____

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 5?**

_____

*Once your civilization had been established, an enemy army burned your necessary food sources...*

6) **How would you alter your previous defenses to avoid the loss of your civilization's food the next time?**

_____

_____

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 6?**

_____

☺

REMEMBER TO TURN IN YOUR COMPLETED

WINTER BOOKLET FOR A SURPRISE REWARD!

**Appendix S**

# LEARN2LEARN
## WINTER BOOKLET – 8th GRADE
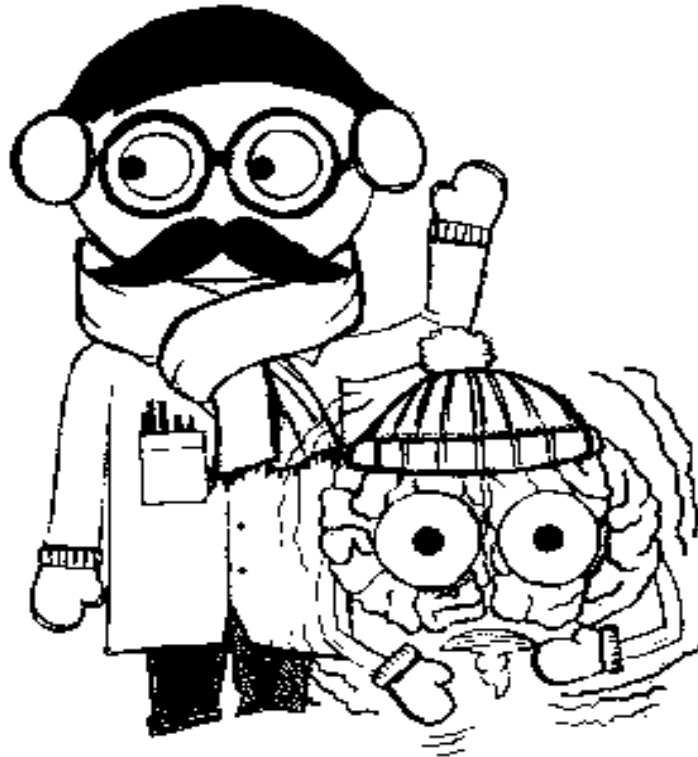
**Name: _____ Block: _____**

Check and date the activities that you have completed:

☐ **Are You Learning to Learn?**
   (Date completed: _____)

☐ **Jesse's History Paper**
   (Date completed: _____)

☐ **Alex's History Paper**
   (Date completed: _____)

☐ **Lewis & Clark Expedition**
   (Date completed: _____)

☐ *The Oregon Trail* **Practice**
(Date completed: _____)

*COMPLETE YOUR BOOKLET BY JAN. 25TH FOR A SURPRISE REWARD!*

ACTIVITY #1
**ARE YOU LEARNING TO LEARN?**

**DIRECTIONS:**

*First, fill out the empty Learn 2 Learn steps as best as you can without looking at your notes. Afterwards, make sure you have the correct steps in order by checking against your laminated* Learn 2 Learn Model. *Write down* <u>*one example*</u> *of each step.*

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**What's central to learning to learn?**

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**STEP:**

**EXAMPLE:**

**Did you get them all right the first time? Which steps did you miss at first?**

_____

_____

ACTIVITY #2
**JESSE'S HISTORY PAPER**

**DIRECTIONS:**

*Please read Jesse's story and answer <u>ALL</u> the questions.*

---

Jesse's history professor at Trinity started the class announcing that they were being assigned a paper on the Civil War. Jesse was handed a sheet with directions for the assignment and its due date, which he quickly skimmed while talking to one of his friends. The following week he ran into Alex who was in the same History class. Alex asked Jesse how he was doing with the paper, which he had completely forgotten about. He then realized that the paper was due in one week.

Swamped with assignments for other classes, Jesse had to start working on the paper the day before it was due. Since it was a paper that required a lot of work and research, Jesse had to stay up all night working on it. Doing the research and readings took up a lot of time so he wasn't able to write out an outline for the paper, and had to jump right into the writing. He had a lot of ideas and knew what he wanted to write, but didn't know how to organize it. He was able to write just the right number of pages but was hesitant that he had included everything the professor had asked for. Rushing to finish it on time, he was unable to proofread it before handing it in for a grade.

---

**QUESTIONS:**

**4) Did Jesse use any sort of strategies to help himself complete the assignment efficiently?**

YES            NO

    **a. If yes, explain what strategies he used…**

_____

_____

_____

**5) Do you think Jesse should have done anything differently? If yes, explain.**

_____

_____

_____

_____

_____

6) **Which steps of the 5-step Learn 2 Learn model did Jesse apply when he was writing his paper? For each step that he used, describe how he did so.**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

**ALEX'S HISTORY PAPER**

**DIRECTIONS:**

*Please read Alex's story and answer <u>ALL</u> the questions.*

---

Alex's history professor at Trinity began class with the announcement that they were being assigned a paper. Alex was handed directions for the paper from his Professor and began to read carefully. He read that the paper would be due in 2 weeks and was on the Civil War. He immediately took out his planner and wrote down when the paper was due.

After class, Alex went back to his room and began to write out a plan for the next two weeks. He knew that he had two other papers and another big project to do before the end of the year and would have to manage his time well. He decided to spend an hour on the paper every day. He first began by doing research on the subject until he was ready to make an outline of everything he planned to write about. After making an outline, he realized his paper was going to be too long and needed to be shortened. He took out some of the information he believed to be irrelevant and started to write the paper. He was done two days early, giving him plenty of time to read the paper over for spelling mistakes before handing it in for a grade.

---

**QUESTIONS:**

4) **Did Alex use any sort of strategies to help himself complete the assignment efficiently?**

    YES            NO

    a.  **If yes, explain what strategies he used...**

    _____

    _____

    _____

**5) Do you think Alex should have done anything differently? If yes, explain.**

_____

_____

_____

_____

_____

_____

**6) Which steps of the 5-step Learn 2 Learn model did Alex apply when he was writing his paper? For each step that he used, describe how he did so.**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ACTIVITY #4
**LEWIS & CLARK EXPEDITION ACTIVITY**

**DIRECTIONS:**

*Imagine you are either Lewis or Clark and are about to embark on your expedition across the western portion of the United States.  Please answer ALL of the following questions about your civilization, providing as many examples as possible:*

1) **What types of supplies should you take on the expedition? Why?**

_____

_____

_____

_____

**\* WHICH LEARN 2 LEARN STEP(S) DID YOU USE TO ANSWER QUESTION 1?**

_____

2) **What are some positives and negatives of going on this expedition? You might consider the journey itself and the potential outcomes.**

| Positives | Negatives |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**\* WHICH LEARN 2 LEARN STEP(S) DID YOU USE TO ANSWER QUESTION 2?**

_____

*Lewis and Clark made many maps of the area during their expedition. Along the way, they recorded the different animals and resources they saw as they crossed rivers, lakes, and mountains.*

3) As you cross the following areas, list what <u>resources</u> you might have seen AND <u>explain how it could help</u> you along your journey:

| *Lewis & Clark traveling down the river* | *Crossing the Rocky Mountains* | *Viewing the Pacific Ocean for the first time* |
|---|---|---|
| *Example:*<br><br>1. **Fish – it provided them food so that they did not starve.** | | |

* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 3?
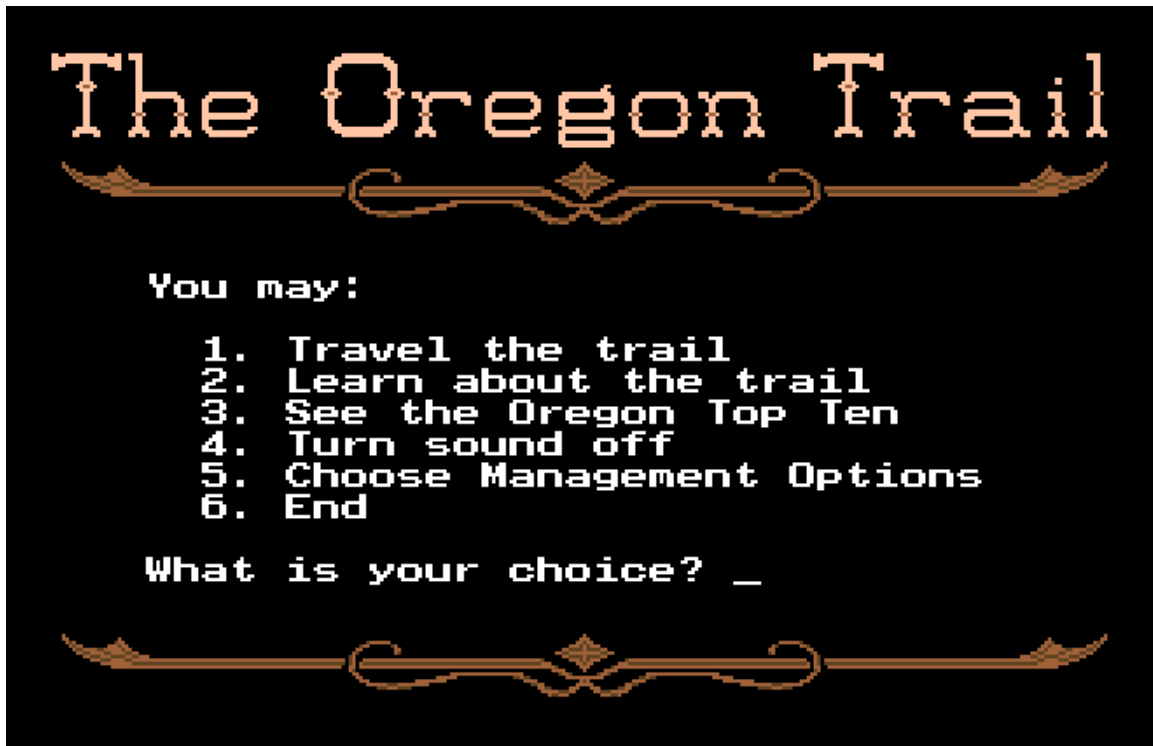
_____

*Below is a map of Lewis & Clark's trek to the Pacific Coast. Imagine you are on the same route BUT must stop upon finding that a wildfire has wiped out the rest of the trail.*
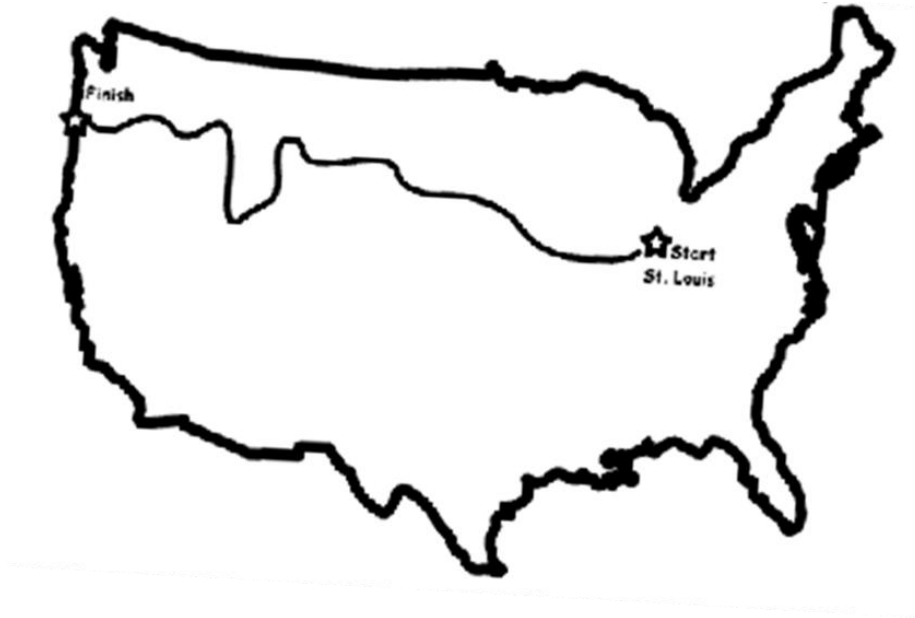


**4) What might you do to fix the situation and get yourself back on course? Why?**

_____

_____

_____

_____

**\* WHICH <u>LEARN 2 LEARN STEP(S)</u> DID YOU USE TO ANSWER QUESTION 4?**

_____

ACTIVITY #5
*THE OREGON TRAIL* PRACTICE



**DIRECTIONS:**

*After learning how to play* The Oregon Trail*, play the game* **AT LEAST THREE TIMES,** *once as each occupation (**banker, carpenter, and farmer**). Do not worry about finishing the game entirely each time, but do make sure you know the differences between each occupation.*

TO ACCESS THE GAME: Open an internet browser and type in the following URL to access *The Oregon Trail* game: **http://j.mp/L2L-Oregon**

***During one of your games, answer the following questions on the next page, giving explanations when necessary:***

1) **What character/occupation did you chose to be?** (Circle one)

**BANKER**                    **CARPENTER**                    **FARMER**

**Explain why you chose this job:** _____

_____

_____

_____


2) **What month did you choose to leave?** (Circle one)

      **MARCH**      **APRIL**      **MAY**   **JUNE**      **JULY**

**Explain why you chose to leave for this month:** _____

_____

_____

_____

_____


3) **How did you spend your money? List how many of each item you bought and the cost, then explain why you chose to spend your money that way.**

  **Oxen:** _____

_____

  **Food:** _____

_____

**Clothing:** _____

_____

  **Ammunition:** _____

_____

**Spare Parts:** _____

_____

4) **If you ever stopped along the way, what changes did you make (if any)? Why?**

_____

_____

_____

_____

5) **Whenever someone got sick/injured/died, what did you do? Why?**

_____

_____

_____

_____

6) **Whenever you crossed a river, which option did you pick? Why?**

_____

_____

_____

**7) Did you make it to Oregon?** (Circle one)

    **YES**                    **NO**

    a. **If yes, report your score:** (Including how many people, items, and food you have left)

    _____

    _____

    _____

    _____

**8) What could you have done differently to finish successfully if you died or to improve your score if you survived?**

_____

_____

_____

_____

_____

**9) How many times did you play the game in total?** (Remember, you need to play the game at least three times, once under each occupation).

    _____

☺

REMEMBER TO TURN IN YOUR COMPLETED

WINTER BOOKLET FOR A SURPRISE REWARD!

**Appendix T**

**Name** _____  **Block** _____  **Date** _____

# LEARN2LEARN: YOUR WRITING GOALS

**What is your goal for this paper/essay?** *(Improve your writing, get a better grade than your last essay, find different ways to research, etc.?)*

_____

_____

_____

## Your Writing Process to Achieve These Goals

**DIRECTIONS:** For each step along the way, *set a due date for yourself* so that you stay on the right track!

| | |
|---|---|
| Due by: | Due by: |
| Due by: | Due by: |
| Due by: | Due by: |
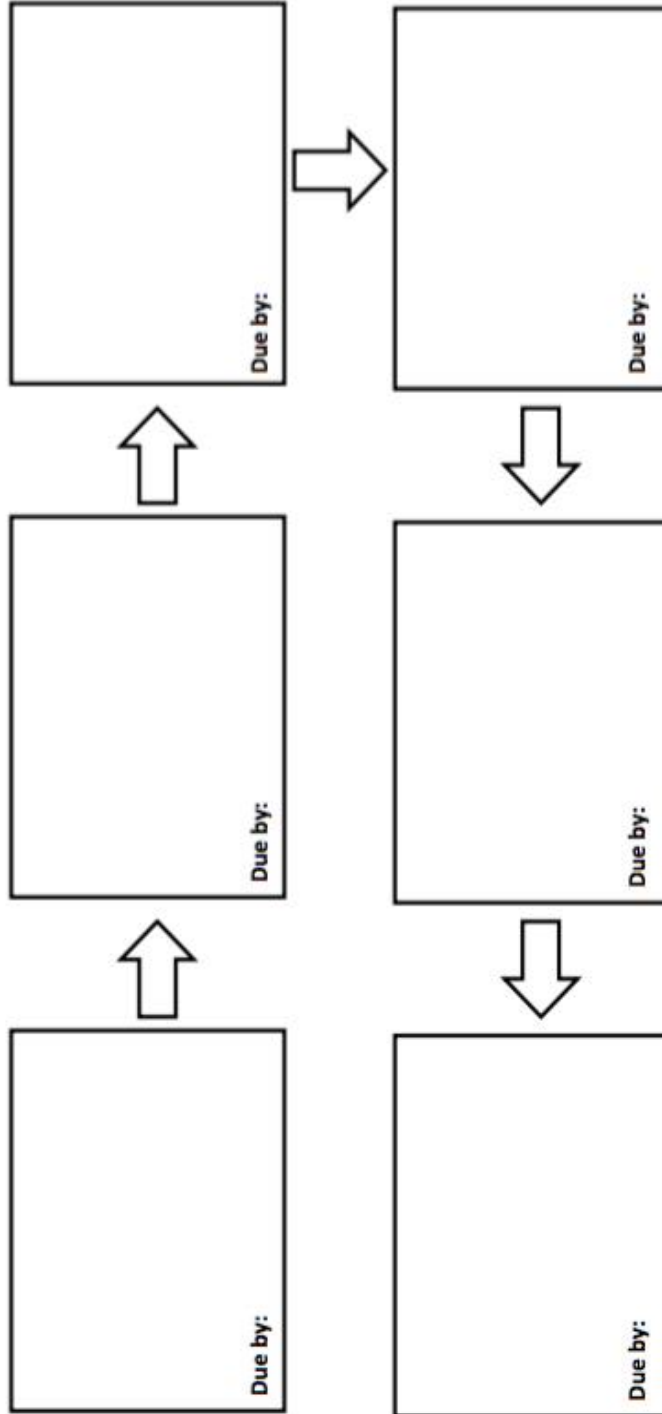
**Appendix U**

Name_____ Block_____ Date_____

**LEARN2LEARN** : WRITING PROCESS REVISING CHECKLIST

*Directions: Answer the following questions to help you revise and edit your rough drafts so that you turn in the best possible paper that you can.*

**\*\*I completed my rough draft on: _____ (date)\*\***

<u>REVIEWING MY IDEAS</u>

1. Have I selected an interesting topic? _____    Have I included enough details? _____
2. How long is my rough draft now? _____    How long does it need to be? _____
3. Briefly list the topic of the paper and the subtopic of each body paragraph:

    *Intro (Main Topic):* _____

    *Body paragraph #1:* _____

    *Body paragraph #2:* _____

    *Body paragraph #3:* _____

    _____

    _____

<u>(RE)ARRANGING THE ORGANIZATION</u>

4. Do my details appear to be in the best order? _____
5. What type of order are they in? (chronological, cause & effect, compare & contrast, etc.)

    _____

6. Do my opening sentences introduce my ideas in each paragraph? _____
7. Do my closing sentences tie up my ideas in each paragraph? _____
8. Do I use transitions to make my organization clear? _____
    a. List some transition words found in the paper: _____

        _____

        _____

9. Do I have an introduction? _____ and a conclusion? _____

<u>CHECKING HOW MY PAPER 'SOUNDS'</u>

10. Does my voice show my interest in the topic? _____

11. Does my voice fit my audience? (Is it formal or informal?) _____

12. Have I written clear, complete sentences? _____

13. Do I have varied sentence structure and word choice? _____


## POLISHING UP MY PAPER

14. Did I proofread the paper for grammatical mistakes? _____

15. Has someone given me feedback on the paper? _____

16. Ask a classmate, friend, family member, etc. to write down **one feedback/review about your paper** in the space below:

    _____

    _____

    _____

    Name/signature of reviewer: _____

## ADDING THE WOW FACTOR

17. What can I do to make this assignment a 'WOW'?  (Get creative, think outside the box, integrate your passions, do some extra research, let you teacher see that you went above and beyond!)

_____

_____

_____

**\*\*I turned in/will turn in my paper on _____ (date)\*\***

---

*Review this worksheet often and make sure you're on track for an A!*

☺

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**Appendix V**

### *Oregon Trail Careers*

**Session 1**

1. Profession: _____

2. How far did you make it?

3. If you were a banker in the 1800s, would you have considered making this trip?

4. What sort of education do you think you would need to be a banker in the 1800s?

**Session 2**

1. Profession: _____

2. How far did you make it?

3. If you were a banker in the 1800s, would you have considered making this trip?

4. What sort of education do you think you would need to be a banker in the 1800s?

**Session 3**

1. Profession: _____

2. How far did you make it?

3. If you were a banker in the 1800s, would you have considered making this trip?

4. What sort of education do you think you would need to be a banker in the 1800s?

**Appendix W**

*Oregon Trail Think-Aloud Sample Interview*

R = researcher          P = participant

R: Do you understand how to play the game?

P: Yes.

R: what do you think the end goal is?

P: To complete the Oregon.

R: ok to make it to the end of the game?

P: Yes, to make it to the end.

R: What occupation did you just pick?

P: Banker.

R: And why did you just pick that?

P: Banker because he has the most money and you can buy more supplies.

R: Why did you choose to leave in April?

P: Because it's like mostly like at the end, so it's closer to May so it might not be too cold or too hot.

R: Why did you choose 8 yolks? so that's 8 pair of oxen.

P: Should I have more time to go with the oxen. They would not die as fast as if you would have had less pairs of oxen.

R: So why did you choose 1500 pounds of food?

P: So the people would starve. So that the people traveling wouldn't starve.

R: So you got 3 pairs of clothing, why did you get so many?

 P: So that people wouldn't lose their clothes or get too cold.

R:  So 30 boxes of ammunition, why did you get that many?

P: So when I'm hunting I would get more food for the people.

R: So why did you buy the spare parts that you did? you got 3 Wagon Wheels and 3 wagon tongues.

P: So I wouldn't if I broke down or I break the wagon I would have to make spare parts I was just get...get them from the wagon.

R: So why did you choose to take the ferry?

P: Because the water was deep and very far across. If I would have had to ford it, it would be too much of a risk so…

R: This time you attempted to Ford the river, why did you do that?

P: because The river wasn't that deep and it wasn't that far across so I would just

R: Why did you choose to size up the situation ?

P: Because I was going to change the pace because of the health is declining, and then the pace is kind of slow so we would have more time but not as many people will get sick.

R: Why did you choose to look at the map?

P: To see my progression.

R: To see how much progress you made?

P: Yes.

R: Why did you choose to check your supplies?

P: Because I saw I suppose you're going down and I just wanted to see if I need to buy anything else.

R: So why did you just choose to stop to rest?

P: So I would heal up and I wouldn't lose as many days on the trail -

R: So you have more time to heal?

P: Yes.

R: So why did you just choose to size up the situation again?

P:Because it said I had bad water so the people wouldn't  get sick on the trail so I'm just going to rest again.

R: Sizing up the situation again?

P: yes

R: why is that?

P: So I could change the rotation of... because food is decreasing by a lot so I….

R: So why did you choose to look at the map ?

P:So I can see the shortest route to go on the map, so it wouldn't take as many days.

R: So you're attempting to trade. Why is that?

P: So are you would get more food for something that I have a lot of.

R: so why did you choose to take the ferry ?

P: Because the depth of the water, it was a lot it was 20 feet. And the width of the river was a lot so I just didn't want to take a chance to just float on the wagon.

R: Signs that the situation again and you're stopping to rest.

P: Yes.

R:  and why are you stopping?

P: Because the health of the people is really poor. I just want to rest and get them more healthy.

R: Why did you choose to 7 days?

P:  because I thought that would be enough...get them healthy enough to get them going on the rest of the trail.

R:  So you're checking your supplies, why is that?

P: To see if I have enough supplies to have for the rest of the trail. So we don't run out.

R: So you're going to buy something?

P: yes

R: So you bought 700 pounds more food.

P: yes

R: And that's because...

P: Because I ran out of food so I had to buy more or they wouldn't get the food that they need and they would die.

R: So why did you choose to caulk the wagon across the river?

P: Because the river wasn't as deep as before so I could just float over or I would drown if I just pick to walk through because it was way too deep.

R: Sizing up the situation again?

P: Yes.

R: And you're resting, why are you resting for 9 days?

P: Because the health is very poor so the health it would go up and I wouldn't like they wouldn't die or something like that.

R: So in the end you only had one person die?

P: Yes.

R: What do you think you could have differently to change this outcome?

P: I could have rested a little longer or the pace or made the pace much slower, because they might have died because of the pace...maybe the pace wouldn't have broken their legs.

R:  Would you have made any changes at the beginning of the game?

P: No