8-2024

Cyclical Patterns of Self-Regulated Learning in College Students

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CYCLICAL PATTERNS OF SELF-REGULATED LEARNING IN COLLEGE STUDENTS

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Psychology

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UTAH STATE UNIVERSITY
Logan, Utah

2024

ABSTRACT

Cyclical Patterns of Self-regulated Learning in College Students

by

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Self-regulated learning (SRL) is a cyclical system in which individuals may use several processes to facilitate learning or performing a skill within many domains including academics. Zimmerman's model of SRL (Zimmerman, 2000) describes three phases of SRL including forethought, performance, and self-reflection. These occur before, during, and after a task, respectively. Zimmerman's model has been the basis for multiple school-based intervention programs, which have been studied regarding academic outcomes and effectiveness. However, research is needed to empirically test the theoretical cyclical connections among processes within the three phases of Zimmerman's model. This dissertation examined college students' SRL subprocesses (i.e., goal-setting, strategic planning, self-efficacy, interest, task-value, satisfaction, and attributions) in relation to a course quiz through an online SRL microanalysis survey. A secondary objective was to examine the relationships within the self-reflection phase and the forethought phases independently as opposed to across phases. Using a sample of 170 college students, we found that SRL satisfaction exhibited significant and positive correlations with goal-setting, self-efficacy, task value, and interest but was not

significantly correlated with strategic planning. Results also indicated no significant correlations between self-reflection phase attributions and any of the examined forethought subprocesses. When examining within the self-reflection subprocesses and within the forethought processes, goal-setting was significantly correlated with self-efficacy and task value. Correlations were non-significant between self-efficacy and task value, self-efficacy and strategic planning, and task value with strategic planning. Further data analysis indicated that goal-setting predicted a small but significant portion of several SRL forethought and self-reflection processes. Consideration for cyclical relationships, types of scoring procedures, and unique empirical investigations addressing SRL literature gaps are discussed. The implementation of conducting an online SRL microanalysis, as well as study implications and limitations also discussed.

(70 Pages)

PUBLIC ABSTRACT

Cyclical Patterns of Self-regulated Learning in College Students

David N. Longhurst

Zimmerman's self-regulated learning (SRL) model is a cyclical approach to learning where learners use several processes to facilitate learning or to perform a skill within many domains. Zimmerman's model describes three phases including forethought, performance, and self-reflection, which occur respectively before, during, and after a task. Theoretically, these phases interact in a cyclical feedback loop in which a person cognitively interacts with a task before, during, and after the activity and continuously do so independently. This model has been the basis for several school-based intervention programs. Those programs have been studied regarding academic outcomes and efficacy; however, less research has empirically tested the theoretical cyclical connections among subprocesses within the three phases of Zimmerman's model. This dissertation's objective was to examine college students' SRL processes (i.e., goal-setting, strategic planning, self-efficacy, interest, task-value, satisfaction, and attributions) in relation to a quiz through an online SRL microanalysis survey. A secondary objective was to examine the relationships within the self-reflection phase and the forethought phases independently as opposed to across phases. This information may help future researchers and clinicians to better understand connections and disconnections of learning processes within SRL for college students. Consequently, such information could lead to adaptations of SRL interventions that can help the learner achieve mastery towards their task of interest.

ACKNOWLEDGMENTS

I want to thank my dissertation committee chair, Dr. Gregory Callan, for their direction, assistance throughout this study, and for aiding me in becoming a self-regulated learner, without which I would not be where I am today. I would also like to thank my committee members, Drs. Kaitlin Bundock, Chris Babits, Brenna Gomer, and Jennifer Grewe for their constant encouragement and assistance. I would especially like to thank my parents, Regan and Jill Longhurst who instilled in me at an early age the value of education and a passion for learning. I also wish to give special thanks to my wife, Bailey Longhurst, for her continual encouragement, support, and her utmost dedication to help me achieve my personal goals. I could not have done it without the influence of so many on my life.

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CHAPTER I

INTRODUCTION

Self-regulated learning (SRL) is often described as a cyclical process in which individuals may use a variety of processes to facilitate learning or performing a skill. We begin the literature review by describing Zimmerman's model of SRL, which entails a social cognitive account of SRL and guides this project. Next, we situate the importance of SRL by briefly overviewing previous SRL literature as it relates to achievement, with particular emphasis on academic achievement. Then we describe the previous literature regarding the cyclical relationships within each phase of SRL. Lastly, we explain SRL microanalysis, which is the key measurement methodology proposed for this project to test the theoretical links among processes.

CHAPTER II

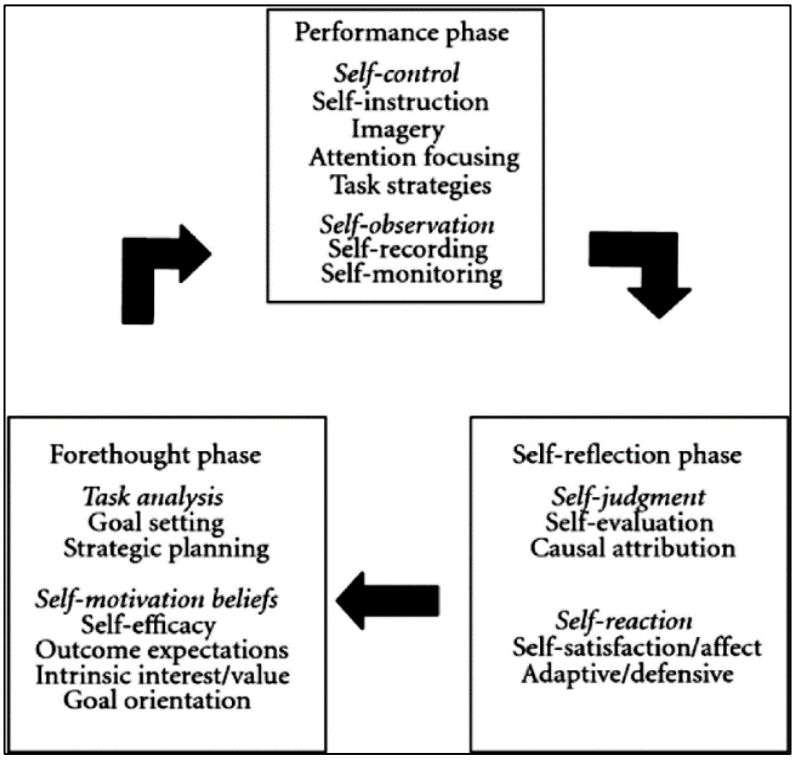
LITERATURE REVIEW

Self-Regulated Learning Defined

Many models of SRL exist, and although there are important distinctions between models, the areas of overlap vastly overshadow the differences (Panadero, 2017). Most models of SRL share a focus on goal-directedness, strategic thinking and actions, and metacognitive processes such as planning, monitoring, and reflecting. Motivation is also recognized to be important within many SRL models, even though some models are more explicit about these connections than others. All models of SRL have strengths and weaknesses and no model is superior for all purposes. However, our project is guided by Zimmerman's (2000) model (see Figure 1).

Figure 1

SRL Model from Zimmerman, 2000



Zimmerman's model posits two key assumptions. First, SRL is perceived as a task-specific phenomenon. Second, the model is perceived as a cyclical process in which the forethought, performance, and self-reflection phases interact within a feedback loop (Callan & Cleary, 2019; Zimmerman, 2000). Each phase of SRL is described in detail next as well as how each phase of SRL relates to achievement.

The Forethought Phase

The forethought phase entails SRL processes and motivational beliefs that are important before someone attempts to learn or perform a task. Regarding SRL processes, learners can set goals and create plans. Goal setting is defined as the formal process whereby either an individual or a team negotiates a set of intended outcomes (Wade, 2009). Researchers can examine the quality of goals by considering multiple facets such as the focus (e.g., achievement versus mastery), specificity level (e.g., vague or well-defined), or the ambitiousness of a goal. Another forethought process is planning, which is defined as the selection of processes that are appropriate for a particular task (Zimmerman, 2000). Often researchers examining planning have focused upon the extent to which learners plan to deploy strategies that will support achievement (Callan & Cleary, 2019; Lassen et al., 2006).

Several motivational beliefs are integral to the forethought phase including self-efficacy, task interest, and task-value. Self-efficacy is defined as one's belief in their capacity to successfully complete a task (Bandura, 1997). Task interest, however, is described as the level of preference or enjoyment one has for the specified task (Fredricks & Eccles, 2002). Task value, which is a motivational construct, refers to one's perception of the task and aids in their examination of goals for the future (Menon, 2022). Task

value increases learner engagement in future tasks, helps learners to complete current tasks, and improves academic success (Jung & Lee, 2018; Vanslambrouck et al, 2018).

The Performance Phase

The performance phase of Zimmerman's model occurs while an individual is engaged with a task. At that time, regulated learners can use two types of processes, self-control and self-observation (Zimmerman, 2002). Self-control entails the implementation of a variety of approaches that broadly can be conceptualized as strategies or tactics that one uses to help overcome challenges that are encountered. Common examples include cognitive strategies, behavioral strategies, metacognitive strategies, imagery, self-instruction, attention focusing, and task-specific strategies.

Cognitive strategies adhere to specific forms of information processing theories of learning (Donker et al., 2014). As an example of using different cognitive approaches, while trying to learn content for a test, students may use a variety of learning mechanisms such as mnemonics or flash cards to support learning. In contrast, behavioral processes often involve the learner using rewards and reinforcement to complete a task (Callan & Shim, 2019). Metacognitive processes are higher-order strategic processes that aid in regulating cognitive or motivational strategies that are focused on tasks of learning (Schraw, 2001; Veenman et al., 2006). A common metacognitive strategy entails summarizing main ideas of content which may increase metacognitive awareness by revealing gaps in understanding (Muwonge, et al., 2019; Schraw et al., 2006).

During the performance phase, regulated learners can also monitor achievements and strategy usage. One type of monitoring is metacognitive monitoring, which is one's awareness of how they are doing, whereas self-recording entails writing information to

facilitate tracking (Tuysuzoglu & Greene, 2015). Monitoring provides important information that learners can use during the third phase of SRL, the self-reflection phase.

The Self-Reflection Phase

Following performance on a task, a regulated learner may use feedback in order to engage in systematic self-reflection. Within the self-reflection phase, learners often evaluate goal-attainment, attribute success or failures to perceived outcomes (i.e., attributions), determine their satisfaction with performance, and identify potential adaptations for future performances of the task.

Given that this project emphasizes two of the self-reflection phase processes (i.e., satisfaction and attributions), we provide a more thorough discussion below. Attributions are the beliefs that one has about the reason(s) for their errors or successes (Savolainen et al., 2012). Different types of attributions exist. There are controllable and uncontrollable attributions, which deal with the extent to which the individual can alter or influence factors contributing to an outcome (Perry et at., 2010). For example, one may attribute receiving a high grade on a test to the effort that they spent on studying the material, which is something that they had some control over. In contrast, an uncontrollable attribution occurs when an individual attributes the score on their test to their teacher's interpretation of their answers.

In comparison to attributions, satisfaction is an affectual facet of SRL. Satisfaction is subjective evaluation of all experience associated with that task that has been completed (Fadel et al., 2018). Research indicates that satisfaction is integral to achieving academic outcomes (Cleary & Zimmerman, 2012). While attributions can be

measured with rating scales or open-ended responses, satisfaction has most often been measured with Likert scales about one's degree of satisfaction with an outcome.

Another process within self-reflection is to generate adaptive or defensive inferences. Adaptive responses are adjustments that increase the effectiveness of learning. For example, a student might discern that their study strategies were ineffective and that they will use flashcards in the future. In contrast, defensive reactions are efforts to protect one's self-image such as withdrawal or avoidance of learning opportunities (Panadero & Alonso-Tapia, 2014; Zimmerman, 2002).

The self-reflection phase is not an "end" of the Zimmerman model. Instead, one's inferences can, theoretically, improve or hamper forethought processes and motivational beliefs before one attempts the task again in the future. That is, more adaptive self-reflection might be expected to result in higher quality goals, more adaptive strategic plans, and higher motivation levels. In contrast, maladaptive self-reflection might result in less ambitious or vague goals, abandonment of strategies, or declines in motivation. Connecting the self-reflection phase to the forethought phase enables regulated learners to become self-correcting and adjust to new challenges.

SRL and Achievement

The SRL processes described above have been shown to facilitate individual and collective achievement. Research indicates links between achievement and SRL processes in virtually all areas of academics such as science (Dibenedetto & Zimmerman, 2013), mathematics (Cuenca-Carlino et al., 2016), reading (Morshedian et al., 2017) and writing (Rosário et al., 2017). There are many variables that play a role in student achievement and life outcomes such as intelligence, resources available (e.g., socio-

economic status; SES), school quality, personality traits, instructional quality, and instruction delivery (i.e., online, in-person, mixed delivery). Even when controlling for many of these important variables, SRL explains a significant amount of the variance in student achievement. For example, Callan et al. (2017) found that using high quality strategies contributes to achievement significantly even when controlling student SES, school SES, and gender.

Other studies have examined SRL as a predictor while controlling variables such as intelligence. Ohtani and Hisasaka (2018) found that metacognition remained a significant predictor of achievement while controlling for intelligence. On a related topic, Caprara et al. (2011) found that when controlling for SES and intelligence, self-efficacy contributed significantly towards academic achievement.

SRL Cyclical Relationships

Zimmerman's model posits that setting goals, creating plans to use strategies, and being motivated during the forethought phase should lead to more adaptive strategy use and monitoring during the performance control phase of SRL. Subsequently, when learners use strategies and monitor, self-reflection processes may be more adaptive. Specifically, they may focus less on achievement outcomes and emphasize how one approached a task. Also, when individuals self-monitor during performance control, they obtain important data to facilitate self-reflection.

Finally, as individuals self-reflect upon their performance, this ultimately leads back to the forethought phase of setting goals, creating plans, and motivation. For example, learners experience different positive and negative emotions depending on their

attributional style, which in turn impacts their motivation and regulation as it relates to future tasks (Panadero & Alonso-Tapia, 2014).

The SRL processes individually support achievement, but when they are connected within a cohesive and cyclical system, there is a synergist effect that can lead to greater achievement gains and enhance adaptive motivation. Cyclical SRL also empowers learners to adapt to new challenges. For example, Greene (2017) showed that higher achieving students tended to better connect SRL processes into a cyclical system. This makes intuitive sense if viewed from the lens of multiple task iterations. That is, if learners engage with a task multiple times (e.g., five math tests in a semester) then reflection following the first test could lead to revisions to goal setting, planning, and motivation to enhance performance for the second test (and so forth).

Some research has empirically examined the cyclical relations among SRL processes using two primary designs. First, researchers have empirically tested cyclical relationships using experimental designs in which interventionists teach students an SRL skill and observe improvements in SRL processes in subsequent phases (Schunk & Swartz, 1993). The second design has used correlational designs in which SRL processes are measured in sequence to establish the temporal requirements of prediction and infer causality (Cleary et al., 2015; 2021). To accomplish this, researchers have often emphasized a task-specific, structured interview called SRL microanalysis, in which regulatory processes are measured while individuals engage with a task of interest (e.g., test taking, practicing free throw shots).

Microanalytic interviews have historically been used in-person as a one-on-one measurement tool, which is time consuming logistically (Cleary et al., 2015; 2016). Only

a few initial studies have utilized adapted, online administration of SRL microanalysis (Callan et al., 2021; Cleary et al., 2012). That initial research has shown that the implementation of SRL microanalysis aids in the prediction of achievement (Ridgley, 2019). However, to date, no research has examined cyclical relationships among SRL processes measured with the online SRL microanalysis format. Below, we overview some of the research that has examined the cyclical theoretical assumption of SRL.

Forethought to Performance Phase Cyclical Relationships

Researchers have revealed cyclical connections between forethought and performance phase processes. For example, teaching fourth grade students to focus on a more adaptive goal (i.e., a goal to focus mastering a process of learning a writing strategy) led to increased strategy use in the performance phase (Schunk & Swartz, 1993). In a correlational design study, Callan and Cleary (2019) used microanalysis to measure student's goal setting and planning before they completed a set of mathematical problems. Then they asked about their strategy usage just after completing the problems. They found a significant relationship between goal setting, planning, and strategy use.

Self-report rating scale research has supported a strong connection between motivational beliefs and performance phase SRL processes (Fadlelmula et al., 2015); However, findings have been mixed when measuring these processes in sequence with microanalysis. For example, significant positive relations have been supported between self-efficacy and strategy use (Callan et al., 2021), but the results have been less conclusive between self-efficacy and self-monitoring. Mandell (2013) found significant positive relationship between self-efficacy and self-monitoring, whereas DiBenedetto and Zimmerman (2010) found non-significant relationships between these constructs.

Furthermore, non-significant relationships were found between motivational beliefs of interest and outcome evaluations and performance phase (DiBenedetto & Zimmerman, 2010), but displayed non-significant relationships with self-monitoring (DiBenedetto & Zimmerman, 2010). Finally, to our knowledge the relationships between task value, strategy use, and self-monitoring have not been studied using microanalysis, but rather in a pre-test and post-test format (see Table 1).

Table 1

Forethought to Performance Research Collected Using Microanalysis

	Performance process	
Forethought process	Performance strategy use	Performance self-monitoring
Goal setting	*DiBenedetto & Zimmerman, 2010	*Mandell, 2013
Strategic planning	*Callan & Cleary, 2019	*Dibenedetto & Zimmerman, 2010
Self-efficacy	*Callan et al., 2021	*Mandell, 2013
Interest	NS Callan et al., 2021	NS DiBenedetto & Zimmerman, 2010
Task Value	N/A	N/A
Outcome Expectations	NS DiBenedetto & Zimmerman, 2010	*DiBenedetto & Zimmerman, 2010

Note. N/A = research has yet to be completed for these SRL processes. * = significant results. NS = Results from this study were non-significant.

Performance to Self-Reflection Phase Cyclical Relationships

Previous research supports that performance phase processes relate to self-reflection processes. For example, students who are trained to focus on the use of strategies during task performance are more likely to attribute performance outcomes to strategies during self-reflection (Cleary et al. 2006), and to identify more strategic adaptations (Cleary et al., 2006). When students use more strategies and self-monitor during the task, they tend to adaptively self-reflect (DiBenedetto & Zimmerman, 2013). In another study, when students were taught to focus on and monitor their use of a free-throw shooting strategy during a practice session, they were significantly more likely to attribute outcomes to the use of strategies and identify strategies during adaptations compared to the control group (Cleary et al. 2006). Similar findings were found during a dart throwing task as well (Kitsantas & Zimmerman, 1998). Also, teaching students to self-monitor their strategies related to improvements in reports of satisfaction (Kitsantas & Zimmerman 1998). Findings regarding the link between performance phase processes and self-evaluation during the self-reflection phase have been studied by multiple researchers (see table 2).

Table 2

Microanalysis Research Examining Relationships Between Performance and Self-reflection Phases

	Self-Reflection Process			
Performance process	Self-evaluation	Attributions	Satisfaction	Adaptive inferences
Strategy Use	*Dibenedetto & Zimmerman, 2010	*Cleary et al. 2006	*Mandell, 2013	*Cleary et al. 2006

Self-monitoring	*Dibenedetto & Zimmerman, 2010	*Kitsantas & Zimmerman, 1998	*Kitsantas & Zimmerman, 1998	*Cleary et al. 2006

Note. N/A = research has yet to be completed for these SRL processes. * = significant results. NS = Results from this study were non-significant.

Self-Reflection Phase to Forethought Phase Cyclical Relationships

Zimmerman's three phase model does not end with self-reflection, but instead these processes can influence, adaptively or maladaptively, forethought phase processes and motivational beliefs. Students who made more strategic attributions during self-reflection reported improved self-efficacy and interest during the forethought phase (Kitsantas & Zimmerman, 1998; Cleary et al., 2015). Attributing successes and failures to strategies after performance often leads to more ambitious goals and plans to use strategies during the next task attempt (Cleary et al., 2015). Moreover, students who reported greater satisfaction tended to report higher self-efficacy and interest during later forethought (Kitsantas & Zimmerman, 1998, Zimmerman, 2013).

Kitsantas and Zimmerman (1998) showed that when participants attributed their failure to strategies, the relationship between attributions and self-efficacy was positive (r = .34). Similarly, when using attributions to predict interest, the correlation between attributions and interest was negative but significant (r = .33; Kitsantas & Zimmerman, 1998). Similarly, prior research has denoted statistically significant correlations between other self-reflection processes and forethought processes. Specifically, attributions and self-efficacy (r = .46), and satisfaction and self-efficacy (r = .61; Cleary et al., 2015).

In addition to the relationships across phases, it is relevant to consider the interconnectedness of SRL processes within each of the three phases. Researchers have

shown significant relationships within phase. In the following section, we overview some of the research within each of the phases (see Table 3).

Table 3

Self-reflection to Forethought Research Collected Using Microanalysis

	Forethought processes				
Self-reflection process	Goal setting	Planning	Self-efficacy	Interest	Task Value
Self-evaluation	N/A	N/A	Cleary, et al., 2015 [a]	N/A	N/A
Attributions	N/A	N/A	Cleary, et al., 2015 [a] Kitsantas & Zimmerman, 1998	Kitsantas & Zimmerman, 1998	N/A
Satisfaction	N/A	N/A	Cleary, et al., 2015 [a]	Schunk, 2001	Schunk, 2001
Adaptive inferences	N/A	N/A	Cleary, et al., 2015[a]	N/A	N/A

Note. N/A = research has yet to be completed for these SRL processes. a = Study was done around test taking with college students.

Relationships within Phases of SRL

Research has shown that forethought processes and motivational beliefs are intercorrelated. For example, goal setting and planning were related within an academic writing task (Kitsantas & Zimmerman, 2002) as well as a basketball free-throw shooting task (Cleary & Zimmerman, 2001). Teaching students to set adaptive goals leads to improvements in self-efficacy and interest (Kitsantas & Zimmerman, 1998) and is

correlated with self-efficacy and persistence (Valerio, 2012). There are multiple pathways of connectedness between forethought SRL processes and motivational beliefs. The primary pathway is goal setting, which aids in the accomplishment of future tasks. The secondary pathway is achievement. Success is a key predictor of self-efficacy and interest (Bandura, 1997).

Like the interconnections within forethought, previous research has examined the relationship between strategy use and self-monitoring. For instance, volleyball players who reported greater strategy use were more effective at self-monitoring (Kitsantas & Zimmerman, 2002) B ased upon a review paper, there have been very few studies that have examined the intercorrelations among processes within the self-reflection phase (Callan et al., in preperation). Some notable studies include Kitsantas and Zimmerman (1998), which revealed in an experimental study that self-evaluation improved attributions. A correlational study (i.e., Cleary et al., 2015), revealed relationships between self-evaluation and satisfaction. This dissertation intends to add to this literature.

Summary

Although prior research has clearly highlighted connections between SRL and achievement, there remains a need to better understand theoretical relationships especially when exploring the connections from the self-reflection phase to the forethought phase for a subsequent task. Through this study, we hope to examine relationships among processes within and across the self-reflection phase and forethought phase of Zimmerman's model of SRL. Moreover, we aim to add to the literature by examining cyclical relationships via an online administered microanalysis measure, as compared to prior research that has used in person microanalysis interviews. We do so

specifically with college students in a general psychology class and address two broad research objectives with specific research questions within each objective. First, we examine the extent that the SRL self-reflection phase processes aid in the prediction of the SRL forethought processes. Second, we examine the extent to which SRL forethought processes are correlated with other forethought processes.

As such, we have compiled the following research questions:

1) To what extent are the following SRL self-reflection processes predictive of SRL forethought processes? Specifically,
    a) Satisfaction predicting (i) goal setting, (ii) self-efficacy, (iii) task value, (iv) strategic planning, (v) interest.
    b) Attributions predicting (i) goal setting, (ii) self-efficacy, (iii) task value, (iv) strategic planning, (v) interest.
2) To what extent are SRL processes correlated within with each other within phase? Specifically,
    a) Satisfaction correlated with attributions
    b) Goal setting correlated with (i) self-efficacy, (ii) task value, (iii) strategic planning.
    c) Self-efficacy correlated with (i) task value, (ii), strategic planning
    d) Task value correlated with strategic planning

CHAPTER III

METHOD

Participants

Participants include 170 college students enrolled at a public university in the intermountain western region of the United States. All participants were recruited from their enrollment in a General Psychology class in the Fall semester of 2021 and Spring semester of 2022. Participant demographic data was collected through the university's Office of Analysis, Assessment and Accreditation. The data gathered from this office includes participant's sex, age, race, their selected major, and their grade point average (GPA). Other collected demographic data included first-generation college student status, and if they were a traditional or non-traditional student.

Of the 170 participants, there was no demographic data collected for 24 participants. Of the remaining participants, 106 participants were female and 46 were male. The mean age of the participants was 23.55 years old (SD = 7.51) and they were primarily freshmen in college. Regarding participant race, 136 identified as White, seven as Hispanic, 2 as Asian, and 7 as other/unspecified. The grade point average among participants was high (M = 3.43, SD = 0.56). Participants represented 42 different majors; the most common was an undeclared major (N = 51) and the next most common majors were Psychology (N = 19), General Studies (N = 11), and Kinesiology (N = 11). Many participants were first-generation college students (N = 113) and 108 were identified as non-traditional students (defined by the university as anyone who is 25 years old or older, has a three-year gap in their education and is independent of parental support).

Materials and Measures

Microanalysis of Quiz Taking

The SRL microanalysis interviews consisted of question prompts that were administered in relation to the specific target task of reflecting about and preparing for course quizzes. The timing of microanalysis question administration was woven into the test reflection and preparation such that SRL processes that occur before learning were measured just before that task, processes that occur during learning were measured during the task, and processes that occur after learning were measured after the task. All SRL microanalysis items were completed through an online survey system (i.e., RedCap). Data analyses was completed with statistical software (JASP).

Six measures were adapted from prior in-person microanalysis interviews. Similar construct definitions, item wordings, and item administration procedures were used from previous research (see Table 4).

After completing the quiz and having an opportunity to look at their quiz grades, students responded to two self-reflection phase measures (i.e., satisfaction, and attributions). Next, participants were directed to think about their next course quiz while responding to questions targeting two forethought phase processes (i.e., goal setting and planning) and three motivational beliefs (i.e., self-efficacy, interest, and task-value). Specifically, participants were prompted, *"*You have an upcoming test/quiz. We want to learn about your goals, plans, and beliefs regarding this test/quiz. Please share everything that you are thinking."

Regarding measurement formats, the strategic planning and attributions measures adhered to a free-response format whereas the goal setting, self-efficacy, interest, and

task-value items used Likert Scale formats. The qualitative responses to the free-response format items were coded to quantify the number of strategies (or strategy steps) participants reported within their answer. Interrater reliability was also calculated for these items (see Procedures, Step 3).

Goal Setting. Consistent with prior microanalysis research (Cleary & Zimmerman, 2004), goal setting was measured using a single, contextualized question. Specifically, the survey asked, "Do you have a goal for this test/quiz? If so, what is the percentage you want to achieve?" A similar item has been used in prior research asking, "Do have a goal you are trying to achieve on your math tests?". Although previously implemented as a qualitative measure, previous research asked the question in relation to a grade they would receive and was found to be valid and reliable (Cleary & Zimmerman, 2004).

Strategic Planning. A one-item measure targeted participants' strategic plans for their upcoming course exam. The survey asked, "What do you need to do to accomplish this goal?" A similar item has been used in prior microanalysis interviews to measure strategic planning related to the participants goals (Callan et al., 2019). To ensure that participants were allowed space to report their full answers, the survey prompted, "Is there anything else that you did?". A coding scheme was developed based on prior research using a similar item (Cleary et al., 2015) to count the number of evidence-based study strategies listed within the participant's responses. Specifically, we used the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, 1991) as the basis of study strategy categories, which mirrored Cleary and colleague's previous research. Two independent raters applied the coding scheme and interrater reliability indicated high

internal consistency. Prior research has shown a similar microanalytic measure to exhibit high interrater reliability and to differentiate experts, non-experts, and novices (DiBenedetto & Zimmerman, 2013).

Self-efficacy. This measure targeted participants' level of confidence for their future quiz and/or test performance. Consistent with research recommendations (Bandura, 2006) self-efficacy was measured with three items across gradients of task difficulty. A cue card displaying a 10-point Likert scale with anchor points was displayed for participants along with the prompt, "Using this scale where one means that you are Not at all confident and ten means that you are Very confident, how confident are you that you can achieve a(n) . . ." followed by each of the following four item stems: "(a) D or better on your next test/quiz (b) C or better on your next test/quiz, (c) B or better on your next test/quiz and (d) A on your next test/quiz." Similar items have been used in microanalysis research (Cleary et al., 2015). The measure utilizes a 10-point Likert-type scale ranging from 1 to 10, with two primary anchors: not at all confident (0), and very confident (10). Researchers took the mean of all four answers of the items and internal consistency was good ($\alpha = 0.89$). Researchers used similar methods to Bandura (2006) and aggregated the results of each of the measures to accrue one self-efficacy score for each participant.

Interest. This one-item measure examined participants' interest in the material that is within the quiz. Participants read, "Using this scale (see cue card) where one means that you are not at all interested and ten means that you are very interested, how interested are you in the material that will be on the test/quiz?". Similar to the self-efficacy measure, a cue card using the 10-point Likert scale was displayed. Prior

microanalysis studies examining student interest with similar measures have indicated divergent validity (Callan et al., 2021).

Task-value. Participants also rated the perceived importance of the material on the next quiz by responding to one item, *"*Using this scale (see cue card) where one means not at all important and ten means very important, how important is the material that will be on the test/quiz?". Prior research using a similar measure reported predictive validity (Kitsantas & Zimmerman, 2002).

Satisfaction. This one-item measure examined participants' satisfaction with the result of their quiz. In this measure, participants were asked, "Using this scale (see cue card) where one means that you are not at all satisfied and ten means very satisfied, how satisfied, how satisfied are you with your grade on this test/quiz?". Previous research has shown that similarly worded measures of satisfaction differentiate SRL skill levels (Zimmerman & Kitsantas, 1997, 1999).

Attributions. Lastly, participants completed a one-item measure of attributions to examine participants' attributions toward their quiz. Prior research has shown this measure exhibited medium to high correlations with other regulatory processes (Cleary, et al., 2006). In this measure, participants were asked, "Why do you think you received the grade you got on this test/quiz?". Participants were then prompted, "We want to make sure you reported everything you are thinking. Are there any other reasons that you earned that grade? If there is nothing else, please type NA." and, "Are there any other reasons? If there is nothing else, please type NA." A coding scheme was developed based on prior research using a similar item (DiBenedetto & Zimmerman, 2013). Research

using a similar measure reported qualitative descriptor of the interrater reliability and differential validity (Kitsantas et al., 2000).

Procedures

Within the General Psychology courses that participants completed the survey, students finished their schoolwork through Canvas, a course management system that has been shown to be an effective tool for professors to use for student learning (Burrack & Thompson, 2021). Throughout the course of a semester, in Canvas, students were required to complete eight quizzes that contributed to their overall grade and could select one quiz grade to drop. Each quiz was worth a total of 50 points. Overall, students were awarded a total of 900 points throughout the course of the semester through the stated quizzes and other assignments.

The course instructor elected to embed the SRL microanalysis interviews within their course and supported participant recruitment via instructor announcements. The instructor posted links to the surveys on the course content page and awarded a small amount of extra credit for completing the survey (0.3% of the overall grade). Students received four opportunities throughout the semester to complete the survey. Although given four opportunities, in the data analysis, the first time a participant completed the study was the only data that was included. Students could complete the survey on dates after the completion of one quiz but at least a week before the next scheduled quiz. Students were told via Canvas announcements of the opportunity to complete a survey for extra credit.

For attributions, a coding scheme was developed based on prior research using a similar item (DiBenedetto & Zimmerman, 2013). All responses were coded

independently by two raters to six categories (see Table 5). most of which were identical to the categories for the attribution question adapted from prior coding data from SRL projects (Cleary et al., 2015; DiBenedetto & Zimmerman, 2013). Participants earned one point for responses that addressed a category within the coding categories. That is, participants could feasibly earn up to nine points for their responses. Two coders independently coded student responses, yielding an interrater agreement that was "Nearly Perfect" (Cohen, 1960; Kappa =.99).

Table 4

SRL Processes Definitions

Measure	Definition
Goal setting	Deciding the procedure of how to specifically what is wanted to be achieved (Zimmerman & Kitsantas, 1997).
Strategic Planning	Consideration of strategies that may be appropriate to aid in the completion of a task (Cleary et al., 2012; Zimmerman, 2000).
Self-efficacy	Belief in their ability to perform a given task successfully (Bandura, 1977).
Interest	Attentional and affective reaction to some elements within the educational environment (Linnenbrink-Garcia et al., 2010).
Task-value	Represents the importance or worth of a task to an individual's overarching goals or personal interest (Ridgely, 2019).
Satisfaction	Fulfillment of the task from the perspective of the learner (Ashgar, 2022).
Attributions	Inferences made about the result of the outcome, including locus of causality, stability, and learner controllability (Weiner, 1985, 2010).

Similar to prior methodology of qualitative coding from Cleary et al. (2015), the frequency method was implemented. Strategic planning responses were analyzed by linking student responses with strategic planning strategies targeted by the Motivated

Strategies and Learning Questionnaire (MSLQ; Pintrich et al., 1991). Using the MSLQ subscales as a guide, participant responses were collapsed and coded as a single measure of quiz preparation strategies. Two coders independently coded student responses, yielding an interrater agreement that was "Substantial" (Cohen, 1960; Kappa = .86).

Table 5

Attributions Coding Categories

Category	Description (definition)	Example	Non-example
Effort	Statement in which the participant indicate that they gave a determined attempt towards some element of their performance, either towards their studying or within the quiz/test taken.	"I studied more than I have before to try and do better on this upcoming test"	"I studied"
Content Selection	Statement in which the participant's indicate that they strategically selected content to maximize their learning.	"I chose to study the specific chapters that I knew would be on the quiz."	"I tried really hard on the quiz."
Spacing	Statement in which the participant's indicate that learning occurred by spreading retrieval opportunities out over time and NOT all at one time.	"I studied multiple times a day for the past week."	"I studied a lot."
Insufficient Spacing	Statement in which the participant's indicate that there was an insufficient amount of learning by spreading retrieval opportunities out over time.	"I should have studied the chapters an hour each day instead of just once before the quiz"	"I should have studied more."
Understanding Monitoring	Statement in which the participant's indicate steps taken towards comprehending the material.	"I reread the chapters to make sure I understood them before taking the quiz."	"I don't understand the readings."

Memory strategies	Statement in which the participant's indicated that they used one or more study strategies (besides note taking/making).	"I made mnemonics for hard topics in this chapter." "I made and studied flash cards."	"I made notes." "I studied my notes" "I retook the quiz to see which time I did best."

Data Analysis Plan

Even though each participant received four opportunities to complete this survey, for the purpose of this dissertation, only the first time a participant completed the study was included in the data analysis. Prior to inferential statistics, an assumption check was completed regarding the planned statistical procedures. Researchers planned to examine the data by computing Pearson's correlation coefficients. Furthermore, for the correlations that were statistically significant, linear regression analyses were also implemented to predict each of the different processes as they interact in the subsequent phase, or within the phase while controlling other relevant predictors.

Predicted Outcomes

As seen in Table 3 of this dissertation, there are multiple processes that have not been examined using task specific measures. The first predictions are in relation to the cyclical feedback loop across phases of SRL. Regarding the connection between self-reflection processes and forethought processes, we predicted that there would be a small to medium association across these phases based upon prior research that has been completed across phases of SRL. We predicted similar results within the phase analyses as well.

We predicted that when examining SRL processes within the forethought phase, there would be a medium to large association. There have been previous SRL studies which have examined other processes across phases which have resulted in medium effect sizes. For example, when examining across phases from forethought to performance there was a medium effect size (r = .54) when examining participants goal setting and their strategy use (Mandell, 2013). Similarly, another study revealed that across the forethought to performance phase that when participants reported their plans for taking a test and strategies used for studying for a test, the correlation had a small effect size (r = .31; DiBendetto & Zimmerman, 2010).

CHAPTER IV

RESULTS

Preliminary Analyses

Prior to inferential analyses, assumptions for planned analyses were completed. First, a Shapiro-Wilk Test Bivariate Normality revealed a violation of normality ($p < .001$) among all variables. Thus, Pearson correlations were no longer deemed appropriate. Instead, Spearman rho correlations were computed among SRL processes (Schober, 2018).

Furthermore, we examined SRL across key demographic variables. For example, some prior research has shown gender differences in the use of SRL skills (Virtanen & Nevgi, 2010). However, we found no significant differences in SRL skills across key demographic variables. Thus, participant data was examined collectively.

Inferential Statistical Analyses

The first objective of this dissertation was to examine the relationships of SRL processes across multiple phases of Zimmerman's model. Specifically, our first research question was, "To what extent are the following SRL self-reflection processes predictive of SRL forethought processes?". We examined two self-reflection processes (i.e., satisfaction and attributions) and their relationships with five forethought processes (i.e., goal-setting, self-efficacy, task value, interest, and strategic planning). We computed correlations and linear regression analyses to predict cyclical relationships among SRL processes. Results are examined in greater detail below.

Satisfaction Results

Regarding the relationships between satisfaction and forethought processes, we found that satisfaction exhibited significant and positive correlations with goal-setting, self-efficacy, task value, and interest (see Table 6). In contrast, satisfaction was not significantly correlated with strategic planning (p = .72). The significant correlations were followed with regression analyses to examine the extent to which satisfaction predicted forethought processes while controlling achievement on the most recent quiz. This was done because prior literature has emphasized the importance of learners' history of successes and failures as a key predictor of goals, self-efficacy, interest, and task-value (Bong 2004; Muwonge et al., 2017). Each of the four overall regression models explained a statistically significant amount of variance in the respective dependent variable (i.e., goal-setting, self-efficacy, task value, and interest). Further details regarding each regression analysis are provided below.

Table 6

Correlation Table

Variable	Satisfaction	Goal Setting	Self-efficacy	Task Value	Interest	Attribution	Strategic Planning
Satisfaction	-						
Goal Setting	.38***	-					
Self-efficacy	.47***	.55***	-				
Task Value	.30***	.32***	.30***	-			
Interest	.38***	.35***	.38***	.73***	-		
Attributions	.16*	.01	.02	.03	.04	-	
Strategic Planning	-.10	-.03	-.15	-.07	-.09	.11	-

* $p < .05$, ** $p < .01$, ***$p < .001$

Regarding the first regression, goal-setting was the dependent variable and satisfaction and prior achievement were the independent variables (see Table 7). Overall, the regression was significant $F(2, 168) = 18.26$, $p < .001$, $R^2 = 0.18$ and predicted a moderate amount of variance in goal-setting (Cohen, 1988). We computed semi-partial regression coefficients to examine the individual contribution of each predictor. Satisfaction did not emerge as a significant predictor of goal setting ($p = .12$) when controlling achievement; however, achievement uniquely explained a small, but significant amount (i.e., 5.8%) of the variance in goal setting ($p < .001$) when controlling satisfaction.

Table 7

Satisfaction Predicting Goal Setting

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.18***
Prior achievement	.52***	.24(5.8%)	.31	3.4***	
Satisfaction	.38***	.11(1.2%)	.15	1.6	

Note. Total/Adjusted $R^2 = .18/.17$; sr^2 = semi-partial squared represents the proportion of unique variance in goal setting accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

The next regression utilized self-efficacy as the dependent variable and the independent variables were satisfaction and achievement (see Table 8). Overall, the regression was significant $F(2, 168) = 27.52$, $p < .001$, $R^2 = 0.25$ and predicted moderate amount of variance (25%) in self-efficacy (Cohen, 1988). We computed semi-partial regression coefficients to examine the contribution of each predictor individually.

Satisfaction uniquely explained a small, but significant amount (i.e., 4.8%) of the variance in self-efficacy while controlling achievement ($p < .001$). Achievement uniquely explained a small, but statistically significant amount (i.e., 4%) of the variance in self-efficacy ($p < .001$) when controlling satisfaction.

The next regression utilized task value as the dependent variable and the independent variables were satisfaction and achievement (see Table 9). Overall, the regression was significant $F(2, 168) = 8.61$, $p < .001$, $R^2 = 0.09$, and predicted a small, but significant amount of variance in task value (Cohen, 1988). Regarding individual predictors, satisfaction uniquely explained a small, but significant amount (i.e., 7.3%) of the variance in task value when controlling achievement ($p < .001$). Achievement did not emerge as a significant predictor of task value ($p = .42$) when controlling satisfaction.

Table 8

Satisfaction Predicting Self-Efficacy

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.25***
Prior achievement	.54***	.20(4%)	.26	3.0**	
Satisfaction	.47***	.22(4.8%)	.29	3.28**	

Note. Total/Adjusted $R^2 = .25/.24$; sr^2 = semi-partial squared represents the proportion of unique variance in variance in self-efficacy accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 9

Satisfaction Predicting Task Value

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.09***
Prior achievement	.18*	-.06(<1%)	-.08	-1.21	
Satisfaction	.30***	.27(7.3%)	.35	3.64***	

Note. Total/Adjusted R^2 = .09/.08; sr^2 = semi-partial squared represents the proportion of unique variance in satisfaction accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

The last regression utilized interest as the dependent variable and the independent variables were satisfaction and achievement (see Table 10). Overall, the regression model was significant $F(2, 168) = 13.90$, $p < .001$, $R^2 = 0.14$, and predicted a moderate amount of variance in task value (Cohen, 1988). Satisfaction uniquely explained a small, but significant amount (i.e., 11.6%) of the variance in interest when controlling achievement ($p < .001$) while achievement did not emerge as a significant predictor of task value ($p = .23$) when controlling interest.

Table 10

Satisfaction Predicting Interest

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.14***
Prior achievement	.23**	-.09(1%)	-.11	-1.21	
Satisfaction	.38***	.34(11.6%)	.44	4.71***	

Note. Total/Adjusted R^2 = .14/.13; sr^2 = semi-partial squared represents the proportion of unique variance in interest accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

Attributions Results

Our results did not reveal significant correlations between self-reflection phase attributions and any of the five forethought processes (see Table 6). Thus, we did not complete planned regression analyses between attributions and forethought processes.

Within Phase Relationships

The second objective of this dissertation was to examine the relationships of SRL processes within SRL phases. We examined relationships between the two self-reflection phase processes (i.e., satisfaction and attributions) and relationships among the five forethought phase processes (i.e., goal-setting, self-efficacy, task value, and strategic planning). Within the self-reflection phase, satisfaction and attributions were significantly correlated in a positive direction (see Table 11). This correlation was followed with a regression analysis to examine the relative predictive contributions between satisfaction and attributions while controlling prior achievement. Although the overall regression model was significant $F(2, 170) = 3.46$, $p < .05$, $R^2 = 0.04$; neither satisfaction ($p = .55$) nor achievement ($p = .13$) emerged as a significant predictor of attributions when interpreting individual regression coefficients.

Table 11

Satisfaction Predicting Attributions

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.04*
Prior achievement	.19*	.12(1.4%)	.15	1.54	
Satisfaction	.16*	.05(<1%)	.06	0.61	

Note. Total/Adjusted R^2 = .04/.03; sr^2 = semi-partial squared represents the proportion of unique variance in attributions accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

Regarding the relationship within the forethought phase, goal-setting was significantly correlated in a positive direction with self-efficacy and task value, but did not correlate significantly with strategic planning. Similarly, when examining other theoretical relationships within the forethought phase, correlations were non-significant between self-efficacy and task value, self-efficacy and strategic planning, and task value with strategic planning (see Table 6).

The significant correlations among goal setting, self-efficacy, and task value were followed with regression analyses to examine the extent to which goal setting predicted self-efficacy and task value while controlling prior achievement. Regarding the first regression, self-efficacy was the dependent variable and the independent variables were goal-setting and achievement (See Table 12). Overall, the regression was significant $F(2, 166) = 38.53$, $p < .001$, $R^2 = 0.32$, and predicted a moderate amount (32%) of variance in self-efficacy (Cohen, 1988). Semi-partial regression coefficients indicated that goal-setting uniquely explained a significant, small amount (i.e., 12.3%) of the variance in self-efficacy while controlling achievement ($p < .001$). Achievement uniquely explained a small, but significant amount (i.e., 5.8%) of the variance in self-efficacy when controlling for goal-setting ($p < .001$).

Table 12

Goal Setting Predicting Self-Efficacy

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.32***
Prior achievement	.54***	.24(5.8%)	.27	3.71***	
Goal setting	.55***	.35(12.3%)	.39	5.48***	

Note. Total/Adjusted R^2 = .32/.31; sr^2 = semi-partial squared represents the proportion of unique variance in self-efficacy accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

The next regression utilized task value as the dependent variable and the independent variables were goal setting and achievement (See Table 13). Overall, the regression was significant $F(2, 166) = 8.72$, $p < .001$, $R^2 = 0.10$, and predicted a small amount (10%) of variance in self-efficacy (Cohen, 1988). Semi-partial regression coefficients indicated that goal setting uniquely explained a small, but significant amount (i.e., 7.3%) of the variance in task value when controlling achievement ($p < .001$). Achievement did not emerge as a significant predictor of task value ($p = .92$) when controlling for goal-setting.

Table 13

Goal Setting Predicting Task Value

Variable	Zero Order Correlation	Semi-partial correlation (Sr^2)	Beta	*T*	Change in R^2
					.10***
Prior achievement	.18*	.01(<1%)	.01	0.1	
Goal setting	.32***	.27(7.3%)	.31	3.70***	

Note. Total/Adjusted R^2 = .09/.08; sr^2 = semi-partial squared represents the proportion of unique variance in task value accounted for a specific predictor after controlling for all other variables.
* $p < .05$, ** $p < .01$, ***$p < .001$

CHAPTER V

DISCUSSION

The intent of this dissertation project was to address several important objectives. First and foremost, we aimed to examine the theoretical relationships among SRL processes within and across phases of Zimmerman's (2000) model of SRL. We examined the extent that processes from the self-reflection phase predicted processes that occur during the forethought phase for a subsequent task iteration (i.e., the next course quiz). Second, this dissertation examined the extent to which SRL processes related within the forethought phase and within the self-reflection phase. In doing so, this dissertation provides data about the relationships among SRL processes that have not been studied previously (i.e., satisfaction predicting goal setting; satisfaction predicting strategic planning; attributions predicting goal setting; attributions predicting strategic planning; and attributions predicting task value).

A third objective was to extend the SRL measurement literature in multiple ways. For example, in comparison to the bulk of SRL research that has used self-report rating scales to examine relationships among SRL processes, this dissertation used a task-specific measure that was completed while participants authentically reflected upon a past quiz and prepared for the next course quiz. These methods contrast self-report rating scales which ask students to report their SRL broadly over the course of weeks or months and to report their more global use of SRL processes within an academic domain (e.g., mathematics). In addition, this dissertation extended the literature by using a relatively novel, online format of microanalysis, which contrasts prior research that has most often

completed microanalysis interviews in person. This is important because this microanalysis interviews are time consuming to administer and coordinate, whereas the self-administered version is much more efficient.

A fourth contribution of this project entails the population and target task of this dissertation project. Specifically, the sample targeted first year college students within an introductory psychology class, while they reflected and planned for a course quiz. Although the bulk of psychological research has been done with college students, most of the literature addressing theoretical relationships among SRL processes has targeted motor tasks or academic tasks with K-12 students. We explore the results for these objectives in greater detail below.

Across Phase Relationships: Self-Reflection Predicting Forethought

We examined the extent to which two self-reflection phase processes (i.e., satisfaction and attributions) predicted five forethought processes (i.e., goal-setting, self-efficacy, task value, interest, and strategic planning). Regarding attributions, we did not find significant relationships with forethought processes (e.g. plans, goals, nor motivational beliefs). These findings differ from prior research indicating that attributions do significantly correlate with self-efficacy and interest (Cleary, et al., 2015; Kitsantas & Zimmerman, 1998; Kitsantas et al., 2000).

In consideration of the mixed results between prior research and the current dissertation, the author examined differences in methodology between prior research and the current dissertation. The methods of the current dissertation most closely mirror the methodology of Cleary, et al. (2015). In their study, differences in correlations between attributions and self-efficacy were significant (r = .38). That study also targeted SRL

situated around an academic evaluation, a test instead of quiz, and also sampled undergraduate students.

However, a notable difference in methods is that Cleary et al. (2015) used in-person microanalysis interviews, while we used an online, self-administered form of microanalysis. One potential hypothesis, which would require further research, is that the online self-administered survey may have elicited fewer participant responses or less effort compared to the in-person interviews used in prior research. Data supports this notion. Participants in our study reported fewer strategic attributions (M = 1.28, SD = 0.94), compared to in-person proctoring (M = 1.39, SD = 0.79; Cleary et al., 2015), which may have led to no correlation being made between self-efficacy and attributions.

An online adaptation of microanalysis may result in fewer responses compared to the in-person microanalysis because the presence of an interviewer could cause participants to invest greater care in their responses or respond more favorably due to demand characteristics.

To date, no research has examined the extent to which microanalysis interviews result in response reactivity, nor has research examined differences of reactivity across in-person and online formats of microanalysis. Another reason for differences in results from in-person and online administration of microanalysis interviews may be that fatigue may set in more quickly when the test is self-administered without an in-person proctor.

Another methodological variation is that the tests targeted by Cleary et al. (2015) were worth a greater proportion of the total course grade compared to the quizzes used in this dissertation. As a result, participants in our study may not have valued the target task in this dissertation as much as they did within the prior study by Cleary and colleagues

(2015). Thus, it is possible that participants in the prior study may have invested a greater amount of effort to identify why they did or did not do well, which may have resulted in considering a greater number of possible causes (i.e., more attributions).

As opposed to attributions, satisfaction correlated with and predicted a number of forethought phase processes in this dissertation. Specifically, satisfaction correlated with goal setting, self-efficacy, task value, and interest. This corroborates prior research showing that satisfaction can predict forethought processes such as self-efficacy, interest, and task value (Cleary, et al., 2015; Kitsantas & Zimmerman, 1998; Kitsantas et al., 2000). Similar to our findings, other research has also shown correlations between satisfaction and forethought processes. For example, Cleary et al. (2015) found significant correlations between satisfaction and self-efficacy. Schunk (2001) also found significant relationships among satisfaction, interest, and task-value. This dissertation contributes uniquely to the literature, however, because our results were obtained with an online microanalysis interview compared to the in-person interviews that were completed in the prior research (i.e., Cleary et al., 2015; Schunk, 2001).

Strategic planning was the only forethought process that did not correlate significantly with satisfaction. To the author's knowledge, no previous research has examined correlations between satisfaction and strategic planning (Callan et al., in preparation). It is possible that strategic planning and satisfaction did not relate significantly due to measurement differences such as Likert scales (i.e., satisfaction) versus open-ended responses (i.e., strategic planning).

Although attributions did not relate well with forethought processes; the results of this dissertation show a significant, positive correlation between attributions and

satisfaction. This finding mirrors prior research (Cleary et al., 2021). In plain terms, this suggests that students who are more satisfied with their performance may be more likely to identify strategies as the cause of their performance, or, that students who attribute their performance to strategies are more satisfied with their performance.

From an intervention implications perspective, the correlation between attributions and satisfaction is encouraging. The correlations do not rise to the level of intervention design research evidence; however, the correlations may warrant future research endeavors exploring if training in one skill leads to increases in the other, and if these effects translate to improvements in forethought phase processes. This is especially relevant considering that many attribution retraining programs exist and show efficacy (Haynes et al., 2011; Perry et al., 1990). Future research should replicate and extend our findings before making sweeping recommendations.

Empirical Investigations Addressing Literature Gaps

This dissertation reported initial examinations of cyclical relationships that had not previously been examined with task-specific measures such as SRL microanalysis. The significant correlations between satisfaction, goal-setting, and planning contribute uniquely to the cyclical SRL literature. Continuing to address gaps in the SRL literature is vital to aid in the examination of effective learning strategies. Furthermore, addressing these gaps specifically towards academic tasks is integral to help in student academic achievement and overall student retention.

Historically, much of the cyclical SRL evidence was based upon motor tasks (e.g., serving a volleyball, dart throwing) and only recently has research bridged these examinations to academic tasks. This dissertation contributes to this aim as well; the

results provide support and add to the literature of SRL and overall academic achievement. Furthermore, this study also aids in helping researchers know what current processes students use or have mastered upon arrival to university instruction. This may help researchers to better estimate college students' mastery of SRL skills.

Key Stakeholder SRL Processes

From a cyclical perspective, it seems relevant to consider which processes correlate with many other SRL processes. This is because because processes that correlate with a greater number of processes may have a greater potential to exert influence within the cyclical model. Some of the measured processes correlated with just one or none of the other SRL processes (i.e., interest, strategic planning, and attributions), or two other processes (i.e., self-efficacy and task-value). However, goal setting and satisfaction correlated with many other processes. Respectively, goal setting was correlated with three other processes and satisfaction was correlated with five other processes.

Satisfaction significantly predicted goal setting, self-efficacy, task value and interest. This is valuable information because satisfaction may be viewed as instrumental in supporting achievements compared to some other SRL processes. For example, one group of processes could be thought of as facilitating strategic thinking and action (i.e., strategic planning, strategy use, attributions, and adaptive inferences). The use of strategies usually has a direct effect on enhancing learner achievement. Goal setting facilitates achievement by narrowing the focus of one's efforts. Motivational beliefs, such as self-efficacy, interest, and task value underlie the vigor one expends, immediacy of task initiation, and persistence in the face of challenges. In contrast, satisfaction is an

effectual component of SRL that may not appear to have an direct of a path to improving achievement. Instead, satisfaction's key role may be to enhance regulatory functioning.

Another important point is that less research has addressed effectual or emotional components in relation to self-regulated learning, however, the results of this dissertation indicate that more research should maybe be done as satisfaction correlates with multiple SRL processes.

In addition to satisfaction, goal-setting correlated with several SRL processes both across phase and within phase. Regression analyses indicated that goal-setting predicted a small but significant portion of satisfaction, self-efficacy, task value, and interest. The high interconnectedness of goal setting is supported by prior research, which has shown goals to relate to motivational beliefs (Sides & Cuevas, 2020; Zimmerman 2012) and satisfaction (Margaryan et al., 2013). Thus, goal-setting is an important process for college students as it relates to their beliefs in improving upon an academic task, thus indicating that goal-setting is highly involved in the process of cyclical SRL.

Limitations

There are important limitations to this dissertation. First, is in relation to the research sample. For this dissertation, all participants were recruited from an introductory psychology college course, which is a beginning course for college students. Thus, the findings of this dissertation may not generalize to more senior college populations or populations that have not attained post-secondary education.

In this dissertation, we also used a regression analysis to further study significant findings, since we controlled for achievement, we propose that more is occurring in our significant findings than just the concept that participant responses were not merely

controlled by their achievement of quiz scores. We pose that motivation, specifically self-efficacy, is also at play for the correlations between multiple SRL processes. This is in contrast to researcher Vancouver (2017), who poses that self-efficacy is a connection between effort and performance, thus having a specific connection to achievement. Our study shows that when we control for achievement, self-efficacy is still a small, but significant portion of SRL processes.

The online adaptation of the microanalysis interview is a relatively new research development, and thus, the validation of this methodology is still largely unknown. Research is needed to study differences in data collection methods. It is possible that participants invest less effort in responses when a human interviewer is not present. It is also possible that a human interviewer could artificially inflate SRL; however, we do not have data to address which format more accurately depicts students' typical SRL.

Another important limitation relates to the inherent limitations of data collected from online measures. If a respondent did not understand a question, they were welcome to reach out to researchers for clarification. No emails were received; however, participants may not have felt comfortable asking for clarifications. In addition, response bias may have been likely as participants may have had stress of being judged over responses. It is also possible that survey fatigue may have been induced due to the number of questions being asked to participants and having them type some of the responses.

The objectives of this dissertation targeted forethought phase processes and self-reflection phase processes. We did not collect regulatory data from the performance phase. Similarly, there are other forethought and self-reflection phase processes that were

not examined. Had data been collected for the other processes, we may have addressed additional literature gaps. Moreover, our predictive models may have been more elaborate. It should also be noted that participants completed this survey online and our findings may not generalize to in person microanalysis interviews. Thus, non-significant results also give credence to allow for further studies to be completed.

It should also be noted that Zimmerman's model of SRL was 24 years old at the time of this dissertation and as such, much has changed in academic achievement and learning methodologies. Other researchers have examined other possible theories of learning by examining lived experiences, alternate views of learning academic learning, advancement of disciplines, self-growth, and community development (Ives & Castillo-Montoya, 2020). Online forms of learning have also impacted the way in which others learn (Abuhassna et al., 2020).

Last, but certainly not least, the data for this dissertation was collected during COVID-19. It is possible that unique thought patterns emerged at this timeline. In addition, it is possible that online computer usage resulted in quicker burnout during online survey taking. Learning loss may have caused the sample population to have a less well-developed repertoire of strategies compared to other cohorts of students

Future Research

Furthering knowledge of cyclical relations among SRL processes has practical implications. For example, the findings of this dissertation are relevant to retention of college students, which is a current area of concern among universities (Barbera et al., 2020). SRL processes such as satisfaction and motivation are important variables that increase retention (Caruth, 2018). Although this study has introduced the academic

importance of variables such as satisfaction and motivation, further research may be implemented on these variables in other areas of academics and across other demographics.

More research is necessary to better understand the skills and learning habits of college students (especially incoming and new students). Surveys such as the online microanalysis could prove useful in identifying trends in learning skills as well as individual needs. Future research may wish to continue to examine the validity of online self-administered measures similar to the one used in this dissertation. It may be particularly important to compare and contrast online self-administered formats to in-person proctored interviews.

The use of online self-administered may also be studied in the future within other areas of SRL, continuing to fill in the gaps of the literature similar to what this dissertation aided in doing. Since this study exclusively examined a general psychology course, future research targeting more advanced courses may be helpful to compare and contrast. Future researchers may also wish to examine this survey as a possible screening measure to aid in SRL intervention methods dependent upon participant answers.

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VITA

David N. Longhurst, M.S.

EDUCATION & LICENSURE

2024 (anticipated)	**Ph.D. School Psychology** Utah State University, Logan, UT
2022	**M.S. Psychology** Utah State University, Logan, UT
2018	**B.S. Bachelor of Science, Summa Cum Laude** Major: Psychology Southern Utah University, Cedar City, UT

CLINICAL EXPERIENCE

2023-2024 **Predoctoral Intern School Psychologist, Cypress-Fairbanks Independent School District,** (Cypress, Tx)
A 10-month, 2000-hour Doctoral School Psychology Internship Program, which meets the requirements for doctoral level psychology students. Provides psychological services to school campuses including consultation, counseling, assessment, and crisis prevention/response specializing in autism assessment. Conducts and supervises other therapists in family therapy and parent trainings through the Family Interaction Training Clinic and Incredible Years Parent Programing. Group supervision, colloquiums, research, and additional professional development opportunities such as the PREPaRE curriculum, Psychological First Aid, state legislation, and evidence-based practices for assessment and intervention.

2022-2023 **Graduate Student Clinician, USU School Mental Health Partnership at Logan High School** (Logan, UT).
Consultation and collaboration with the school counseling team to provide school mental health services for high school students. Administering batteries of mental health assessments, developing treatment plans, completing risk assessments, and conducting individual and small-group therapy sessions with adolescents. Graduate student clinicians also were involved with tracking progress monitoring data and consulting with teachers and parents. Common therapeutic strategies include cognitive behavioral therapy (CBT), motivational interviewing, and acceptance commitment therapy (ACT).

2021-2022 **Graduate Student Clinician, Integrated Assessment Division of the Behavioral Health Clinic at the Sorenson Center for Clinical Excellence at USU** (Logan, UT).
Evaluating children, adolescents, and adults for a variety of developmental, behavioral, and academic concerns, specializing in the assessment of neurodevelopmental disorders. Provide family consultations and feedback

sessions concerning diagnoses completed by the interdisciplinary team of licensed professionals in the fields of psychology, speech-language pathology, social work, and audiology. Assessments used within this position include, Adaptive Behavior Assessment System, all modules of the Autism Spectrum Diagnostic Observation Schedule, Autism Spectrum Rating Scale, Behavior Assessment System for Children, Bayley Scales of Infant and Toddler Development, Behavior Rating Inventory of Executive Functioning, Bracken School Readiness Assessment, Conners' Adult ADHD Rating Scales, California Verbal Learning Test-3 and Children, Child Behavior Checklist, Childhood Autism Rating Scale Second Edition, Children's Depression Inventory-2, Conner's 3, Gray Oral Reading Tests, Kaufman Test of Educational Achievement, Minnesota Multiphasic Personality Inventory, Multidimensional Anxiety Scale for Children, Stanford-Binet Intelligence Scale-5, Vineland Adaptive Behavior Scales Third Edition, Wechsler Abbreviated Scale of Intelligence-Second Edition, Wechsler Adult Intelligence Scale-Fourth Edition, Wechsler Individual Achievement Test, Wechsler Intelligence Scale for Children-Fifth Edition, Woodcock Johnson, and Wechsler Preschool & Primary Scale of Intelligence Fourth Edition.

2021-2022 **Graduate Student Clinician, Sex and Gender Minority Support, Division of the Behavioral Health Clinic** (Logan, UT).
Building and maintaining healthy relationships for clients and working through depression, stress, or anxiety. Navigating relationships for clients who have less accepting family and friends and working with those having difficulties surrounding coming out or overcoming sexual challenges. The clinician also manages shame, discrimination, stigma, and resolving conflict around religion. Supervised with writing letters of support for transgender and gender diverse individuals seeking hormone replacement therapy or gender affirmative surgeries. Common therapeutic strategies included emotion-focused therapy (EFT), time-limited dynamic psychotherapy (TLDP), and CBT.

2021-2022 **Utah Regional Leadership Education in Neurodevelopmental Disabilities (URLEND)**
Completed 300 hours of clinical, research, and leadership experiences with neurodevelopmental disabilities. Some of these experiences included weekly seminars encompassing topics related to children with neurodevelopmental disabilities, consultations with local families, interdisciplinary service provision, and completing a year-long leadership project with other trainees. Completed a leaderships research project by creating and sending surveys to Spanish speaking families about their experiences with interpretation services within early intervention programs.

2020-2021 **Graduate Student Clinician, Behavior Specialist, Up to 3 Early Intervention Program** (Logan, UT).
Creating and conducting behavioral interventions for children under the age of three and organizing parent trainings for families whose children have behavioral problems, disabilities, or problems that impair learning or social functions. The behavioral specialist duties also include conducting clinical assessments of specific problem behaviors, assessment report writing, contributing to individual family service plan (IFSP) developments, and weekly interdisciplinary team

meetings. Common behavioral strategies conducted included operant conditioning principles such as positive and negative reinforcement, contingency management, time out, response cost, and extinction. Other intervention strategies discussed during parent trainings included token economy and psychoeducation of developmental milestone monitoring and mindfulness strategies.

2019-2020 **School Psychologist Extern, Box Elder School District** (Brigham City, UT)
Exposed to clinical practice in school settings with opportunities to develop and enhance skills that are based on research findings within a school system. Duties included giving academic and cognitive assessments, interventions, and consultation. This initial practicum helped in developing foundational skills and interests to the field of psychology to prepare for more advanced practicum training experiences. Assessments used within this position included Behavior Assessment System for Children, Bracken School Readiness Assessment, Kaufman Test of Educational Achievement, Wechsler Individual Achievement Test, Wechsler Intelligence Scale for Children-Fifth Edition, Woodcock Johnson, and Wechsler Preschool & Primary Scale of Intelligence Fourth Edition. Common therapeutic strategies included social skill training, CBT, and ACT.

2018 **Counselor, Summer Treatment Program at Camp Takoda** (Salt Lake, UT)
Managed children with autism and attention-deficit/hyperactivity disorder, also conducted daily social skill interventions. Provided academic skills interventions in areas such as math, reading, and science. The counselor was also in charge of teaching mindfulness strategies to children and assisting other counselors with children who needed more direct supervision and instruction.

2017 **Counselor, Center for Children and Families, Florida International University** (Miami, FL)
Overseeing multiple children with attention-deficit/hyperactivity disorder, autism, and other neurodevelopmental disorders. Goals for treatment included teaching problem solving and skills to improve peer relationships, increase academic performance and ability to follow instructions, as well as complete tasks and comply with requests. Involved with weekly parent trainings focusing on skills for parents to develop, reinforce, and maintain positive changes. Other daily activities included data collection and interpretation of observed behaviors. Implementing evidence-based treatment, making treatment decisions through daily report cards and individualized plans, coaching individual children, groups, and families.

2017 **Group Therapy Facilitator, College of Humanities and Social Science, Southern Utah University** (Cedar City, UT)
Facilitating discussion in the group therapy sessions. Assisting the lead therapist in thoughtful questioning and providing insight on the group dynamic. Aided the dynamic of the group by supporting a positive climate and making the group feel safe so members may be vulnerable with each other.

TEACHING EXPERIENCE

Summer, 2022	**Instructor, Utah State University** (Logan, UT). Instructor for PSY 3500, Research Methods, for the Psychology Department, Emma Eccles Jones College of Education and Human Services.
Spring, 2022	**Instructor, Utah State University** (Logan, UT). Instructor for PSY 3500, Research Methods, for the Psychology Department, Emma Eccles Jones College of Education and Human Services.
2020-2021	**Teaching Assistant, Utah State University** (Logan, UT). Teaching Assistant for PSY 1400; 1410 Analysis of Behavior, and PSY 4420 Cognitive Psychology for the Psychology Department, Emma Eccles Jones College of Education and Human Services.

PEER-REVIEWED PUBLICATIONS

Bundock, K., Callan, G., McClain, M., Benney, C., **Longhurst, D**., Rolf, K. (2024) Teaching Constant Rate of Change Problem Solving to Secondary Students with or At-Risk for Learning Disabilities: A Virtual Intervention. *Learning Disability Quarterly*. https://doi.org/10.1177/00222194241254094

McClain M. B., Yoho S. E., Drill, R. B., Haverkamp, C. R., Schwartz, S. E., Barker, B. A., **Longhurst, D.,** Upton, S. R. (2023). Reading Skills and Background Noise in Autistic and Non-Autistic Children: A Pilot Study1-13. *Contemporary School Psychology. https://doi.org/10.1007/s40688-023-00450-y*

Callan, G. L., **Longhurst, D**., Shim, S. S., & Ariotti, A. (2022). Identifying and predicting teachers' use of practices that support SRL. *Psychology in the Schools.* https://doi.org/10.1002/pits.22712

McClain, M. B., Callan, G., Harris, B., Floyd, R., Haverkamp, C., Golson, M., **Longhurst, D**., & Benallie, K., (2021). Methods for addressing publication bias in school psychology journals: A descriptive review of meta-analyses from 1980 to 2019. *Journal of School Psychology, 84*, 74-84. https://doi.org/10.1016/j.jsp.2020.11.002

Callan, G. L., DaVia Rubenstein, L., Ridgley, L. M., Speirs Neumeister, K., Hernandez Finch, M., & **Longhurst, D.** (2021). Measuring and predicting divergent thinking with a self-report questionnaire, teacher rating scale, and self-regulated learning microanalysis. *Journal of Psychoeducational Assessment*, *39*(5), 549-562. https://doi.org/10.1177/07342829211005288

Bundock, K., Callan, G. L., **Longhurst, D**., Rolf, K. R., Benney, C. M., & McClain, M. B. (2021). Mathematics Intervention for College Students with Learning Disabilities: A Pilot Study Targeting Rate of Change. *Insights into Learning Disabilities*, *18*(1), 1-28. https://files.eric.ed.gov/fulltext/EJ1295246.pdf

Callan, G., **Longhurst, D**., Ariotti, A., & Bundock, K. (2020). Settings, exchanges, and events: The SEE model of self-regulated learning supportive practices. *Psychology in the Schools, 58(5),* 773-788. https://doi.org/10.1002/pits.22468

PUBLICATIONS UNDER REVIEW

Longhurst, D., Callan, G., Crowson, K., Halterman, A. (*In review*). Assessing the effectiveness of a virtual repeated reading intervention with self-monitoring on reading fluency. *Assessment for Effective Intervention.*

OTHER PUBLICATIONS

Longhurst, D., Callan, G., (2021). Teachers' Use of Practices that Support Self-regulated Learning. Newsletter published in *American Educational Research Association –Special Interest Group Studying and Self-regulated Learning Newsletter, Summer (2021),* 11-12.

Callan, G. L., & **Longhurst, D**. (2018). Integration of self-regulated learning in educational practice. Newsletter published in *American Educational Research Association – Studying and Self-Regulated Learning Special Interest Group Times Magazine, 1(*8) 16-17.

PRESENTATIONS AT NATIONAL AND INTERNATIONAL PROFESSIONAL MEETINGS

Halterman, A., Crowson, K., **Longhurst, D**., Callan, G., Bundock, K., Dickies, W., Kerr, M. (February 2024). Improving Mathematics Achievement via an SRL Intervention. Poster to be presented at the annual conference of the National Association of School Psychologists, New Orleans, LA.

Crowson, K., Halterman, A., **Longhurst, D**., Callan, G., Bundock, K., Dickies, W., Kerr, M. (February 2024). Improving Self-Regulated Learning for Secondary Students Using a Mathematics Intervention. Poster to be presented at the annual conference of the National Association of School Psychologists, New Orleans, LA.

van Dijk, W., Bundock, K., & **Longhurst, D**. (October 2023). Support Structures and Intent-to-Stay of Instructional Coaches: Personal Network Analysis in SPED. Poster presented at The Teacher Education Division of the Council for Exceptional Children Annual Conference, Long Beach, CA.

Longhurst, D., Bera, J., Roanhorse, T., McClain M. B., (February 2023). Assessing convergent validity and consistency among standardized reading tests. Poster presented at the annual conference of the National Association of School Psychologists, Denver CO.

Longhurst, D., Halterman, A., Lewis, C., & Callan, G. (February 2022). Motivation improvements using a repeated reading intervention with self-monitoring. Paper presented at the annual conference of the National Association of School Psychologists, Boston, MA.

Longhurst, D., Tibbits, S., Barton, T., & Callan, G. (February 2022). Effectiveness of an online repeated reading intervention on fluency. Poster presented at the annual conference of the National Association of School Psychologists, Boston, MA.

Longhurst, D., Golson M., Benallie K., McClain M. B., Callan G., Harris B., & Floyd, R. (August 2021). An examination of publication bias in school psychology journals. Poster presented at virtual annual conference of the American Psychological Association.

Longhurst, D., Callan, G., Halterman, A., & Tibbets, S. (April 2021). Teachers' use of practices that support self-regulated learning. Poster presented at the virtual annual conference of the American Educational Research Association.

Longhurst, D., Halterman, A., Barton, T., Callan, G., & Yang, N. (February 2021). The SEE Model: Supporting school psychologist consultations regarding self-regulated learning. Paper presented at the virtual annual conference of the National Association of School Psychologists.

Longhurst, D., Ariotti, A., Yang, N., Callan, G., & Johnson, M. (February 2021). Barriers impeding self-regulated learning practices in the classrooms. Poster presented at the virtual annual conference of the National Association of School Psychologists.

Longhurst D., Ariotti A., Callan G., Johnson M., Johnson E. (August 2020). Teacher practices that support self-regulated learning. Poster presented at the virtual annual conference of the American Psychological Association, Washington D.C.

Longhurst D., Callan, G., Johnson, M., Ariotti., Peterson, K., Lewis J., & Carpenter, A. (February 2020). Developing self-regulated learning in classrooms. Poster presented at the annual conference of the National Association of School Psychologists, Baltimore, MD.

Longhurst D., Benney, C., Callan, G., & McClain M. B. (February 2020). Measuring reading motivation with microanalysis. Poster presented at the annual conference of the National Association of School Psychologists, Baltimore, MD.

Plesch, K., Webster, W., **Longhurst, D**., & Grimes, M., (November 2017). Revising the sibling conflict questionnaire. Poster presented at the annual conference of the Association for Behavioral and Cognitive Therapies, San Diego, CA

PRESENTATIONS AT STATE AND REGIONAL MEETINGS

Tibbets, S., Barton, T., **Longhurst, D**., Callan, G. (April 2022) How to Use Interviews to Measure and Design Interventions for Academic Enablers. Workshop conducted at the annual conference of the Rocky Mountain Psychological Association, Salt Lake City, UT.

Longhurst, D., Ariotti, A., & Callan G., (October 2019). Teachers' practices for developing student self-regulated learning. Poster presented at the annual conference of the Utah Association of School Psychologists, Farmington, UT.

Longhurst, D., Tibbets, S., Halterman, A., & Callan, G., (October 2019). Changes within the implementation of SRL microanalysis. Poster presented at the annual conference of the Utah Association of School Psychologists, Farmington, UT.

Longhurst, D., Halterman, A., Tibbets, S., & Callan, G., (October 2019). Measuring reading motivation with microanalysis. Poster presented at the annual conference of the Utah Association of School Psychologists, Farmington, UT.

Callan, G. L**.,** & **Longhurst, D**. (April 2019). Measuring process change with SRL microanalysis. Poster presented at the annual conference of the Rocky Mountain Psychological Association, Denver, CO.

Callan, G. L**.,** & **Longhurst, D**. (April 2019). Teachers' practices to develop student self-regulated learning: Utilized and underutilized practices. Poster presented at the annual conference of the Rocky Mountain Psychological Association, Denver, CO.

HONORS, AWARDS, GRANTS, AND FUNDING

2022 **Anthony LaPray Scholarship in Psychology**
Utah State University

2022 **Kenneth W. Merrell Scholarship**
Utah State University

2018 **Applied Psychology Award**
Southern Utah University

2016 **Psi Chi: The International Honor Society in Psychology**

SERVICE AND VOLUNTEER EXPERIENCES

2020-2021 **Campus Ambassador** – American Psychological Association

2019-2021 **USU School Psychology Graduate Program Mentor** – Utah State University Student Affiliates in School Psychology

2019-2021 **Student Representative** – Utah Association of School Psychologists

2018-2021 **Research Lab Leader** – Self-regulated Learning Lab

2019-2020 **Awareness and Promotion Committee Member** – Utah State University Student Affiliates in School Psychology

2018-2019 **Professional Development Committee Member** – Utah State University Student Affiliates in School Psychology

PROFESSIONAL AFFILIATIONS

2023-present **Texas Association of School Psychologists (TASP)**

2020-present **American Educational Research Association (AERA)**

2019-present **American Psychological Association (APA)**

2018-present **Utah State University Student Affiliates in School Psychology (SASP)**

2018-present **National Association of School Psychologists (NASP)**

2018-2023 **Utah Association of School Psychologists (UASP)**