TASK FOCUSED IN THE AGE OF DISTRACTION: HIGH SCHOOL AVID STUDENTS USE OF DIGITAL LEARNING LOGS TO SUPPORT SELF-REGULATED LEARNING IN A ONE-TO-ONE CHROMEBOOK SETTING

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DEDICATION

Dedicating this work to my daughters, Margaret and Claire Roberts, is my greatest joy. May they always know they can achieve anything. When others say you can't, know that you can!

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Thank you to everyone in my education career that provided a direct impact on pushing me to this day. To my dissertation committee and chair, thank you for your guidance. This entire degree has been a challenging but great learning experience. A special thank you to my educational mentors, who saw this in me before I saw it in myself, and who served as models of life-long learning and dedicated growers of people.

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Ultimately, thank you to God, who highlighted this verse for me when I first set out on this challenge, "And he informed me, and talked with me, and said, I am now come forth to give you skill and understanding." (Daniel 9:22). It has undoubtedly been a promise fulfilled as I have been able to complete task after task and come to this day.

ABSTRACT

The purpose of this action research was to evaluate the impact of digital learning logs to support self-regulated learning (SRL) for high school students of average achievement who have individual access to digital connectivity within the classroom. Increased student access to and use of digital connectivity within school settings has resulted in access to high-interest material and off-task behavior. A small, rural, Southern high school provided each student a Chromebook. Additionally, this school implemented the Advancement via Individual Determination (AVID) program to provide instruction for academic strategies to increase achievement. This setting was selected to provide SRL strategy support in a networked learning environment, while also aligning to academic needs and program goals. Questions used to inform this research were: (a) how and to what degree does SRL strategy support affect student metacognition SRL skills, (b) how and to what degree does SRL strategy support affect performance control, and (c) how do students describe the impact of SRL strategy support on their task-related device use.

Over six weeks, 14 high school students in grade 10 used digital learning logs to support SRL through a three-stage SRL loop of forethought, performance control, and reflection. Data collection and analysis of pretest and posttest results from the metacognitive SRL (MSRS), effort management, and time and environment management subscales of the Metacognitive SRL Questionnaire (MSLQ), determined significant impact on all subscales. Learning logs entries were collected as structured diaries. Self-ratings within the learning logs provided statistically significant improvement in the areas

of action planning, learning goal progresss, effort regulation, and time management. Interviews provided additional qualitative data. Emergent themes from inductive analysis included support for learning through managing tasks, focusing on task, and emphasizing learning.

Findings presented reflect the impact of digital learning logs as support for SRL and task-related device use in a one-to-one computing classroom, including increases in metacognitive SRL skills and performance control. Student responses presented describe how log use impacted learning behaviors and technology use. Implications include the importance of interacting with all SRL phases for SRL growth, and as a scaffold for increased choices within learning tasks.

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CHAPTER 1

INTRODUCTION

National Context

The National Education Association (2013) and the South Carolina Education Oversight Committee (2015) call for students to become self-directed learners that can adapt to digital development. Adapting to digital development, a shift to more pervasive high technology use can be a problem area for students as schools increase networked access through district-issued and bring your own device programs (Bebell & Dwyer, 2010; Pellas, 2014). Research on academic outcomes from such programs varies (Rashid & Asghar, 2016; Williams & Larwin, 2016). While research settings and results differ, ultimately, devices will be used in classrooms to support student competency demands for connectivity, application, and job skills (National Education Association, 2014).

Teachers and students describe student device use in instructional settings with a one-to-one student to computer ratio as having increased off-task behaviors and a harmful effect on focus (Aagaard, 2015; Andersson et al., 2014; Wood et al., 2011). However, dynamic, adaptive, and interactive resources available on devices support student knowledge gaps (Perry & Steck, 2015). Additionally, collaborative and organizational tools available on devices can benefit student executive learning needs (Leary et al., 2016). These knowledge and skill benefits gained from device use outweigh the need for device removal, leading researchers documenting learner distraction to call for research

on strategies that support the productive use of devices for learning (Aagaard, 2015; Kulesza et al., 2011).

The National Education Technology Plan defines the role of technology in the classroom as a tool for increased equity and access (Office of Educational Technology, 2017). This plan is presented and updated by the Office of Educational Technology within the U.S. Department of Education. They recommend accessibility increase through the implementation of the Universal Design for Learning (UDL) framework (Office of Educational Technology, 2017). Guideline three of the UDL framework calls for a focus on affective behaviors, due to their impact on and relationship with cognition (Center for Applied Special Technologies, 2011). Specifically, checkpoint nine emphasizes the role of SRL to support engagement (Center for Applied Special Technologies, 2011).

Self-regulated learning (SRL) focuses on motivational and metacognitive awareness of processes that support one's learning (Paris & Paris, 2001; Zimmerman, 1989). This process occurs in a three-stage feedback loop of forethought, performance control, and reflection (Zimmerman, 2002). Having and using SRL strategies supports student learning, demonstrated by findings showing students with consistent use of SRL skills correlating with greater engagement with learning processes (Pellas, 2014; Perry & Steck, 2015). To support the development of SRL, some learners need instruction and modeling for SRL practices (Center for Applied Special Technologies, 2011). Intervention occurring in context provides students authentic application of SRL strategies (Cleary et al., 2012). Moreover, metacognitive SRL skills, such as planning and monitoring goal progress, focus on students checking and correcting actions to improve

learning performance (Pintrich et al., 1991; Zimmerman, 2002). Mainly, targeting intervention for performance control in the form of effort regulation will work to improve self-control and self-observation processes (Boekaerts & Corno, 2005; Cleary & Zimmerman, 2004; Zimmerman, 2002). These processes also support student task-related device use as they monitor and control actions needed for successful task completion.

Nationally, the New Media Consortium calls for schools to provide students with collaborative and more in-depth learning opportunities supported by technology integration (Adams-Becker et al., 2016). However, student off-task behaviors can hinder efforts to push rigor and self-directed perseverance in classrooms due to the use of devices to avoid cognitive discomfort such efforts require (Taneja et al., 2015). The body of published research combining SRL strategies with one-to-one computing environments is limited to some recent dissertations, demonstrating the emerging nature of this research (e.g., Pennypacker-Hill, 2013; Wilson, 2013).

Local Context

This action research study took place at one fringe-rural high school in the midlands of South Carolina. This school must meet the needs of a diverse 550 student population, including 12% special education, 34.6% gifted education, and a 72.2% poverty index (South Carolina Department of Education, 2016). Student population by grade levels are: grade nine (174 students), grade 10 (123 students), grade 11 (99 students), and grade 12 (114 students) (School District, 2016). In 2016, the four-year graduation rate was 83.9%, with 58.1% of graduates attending post-secondary education (South Carolina Department of Education, 2016).

In 2014, the four-year graduation rate was 74.1% (South Carolina Department of Education, 2016). Responding to a need to improve the graduation rate, and at least meet the state graduate rate (80.3%), the school implemented the High Schools That Work framework. Components of the framework include senior-year redesign with an early college model, career pathways, project-based learning, and targeted instructional support (Southern Regional Education Board, 2009). Over the past three years, redesigns of programming and supports furthered alignment with components of this framework.

In the 2017-2018 school year, Advancement Via Individual Determination (AVID) programming began at the school. Freshmen, sophomores, and junior students have the opportunity to apply for and receive acceptance to the program based on qualifications including being a potential first-generation college student, making satisfactory academic progress (i.e., 2.5-3.5 GPA), and being on-track for attending college. Over the next two years, programming expanded to qualified students in grades nine through 12. Programming includes school-wide strategy adoption such as Cornell notes, concept mapping, and quick writes. An AVID elective class is mandatory for AVID students to get support for developing skills like organization, questioning, and goal-setting.

The South Carolina Graduate Profile recommends that students graduating from our schools should develop communication, information, media, and technology skills as part of their education (South Carolina Education Oversight Committee, 2015). In 2015, the school district received a grant from the South Carolina State Department of Education to provide a Chromebook for every student in grades six through 12. The 2016-2017 school year was the first full-year with a one-to-one student to computer ratio.

An instructional coordinator and a technology coach are working to support teachers with developing curriculum and instruction that allows students to use provided Chromebooks in collaborative, problem-based learning. Teachers have shared that an obstacle during such instruction is a lack of student focus on assigned tasks. They report student device use includes socializing, playing games, browsing the internet, and a variety of other off-task applications, generating teacher frustration with instructional device use.

Providing SRL strategy support is an intervention I see as an appropriate fit for the given context and concerns. AVID elective classes provide a specified time for an overview of SRL and interaction with intervention supports. Targeting this intervention with AVID students aligns with and supports individual determination with SRL. Finally, modifying and testing previous research models for SRL strategy support within a low student to computing device ratio setting will expand the scope and application of prior research (Cleary & Zimmerman, 2004).

Statement of the Problem

Student off-task behaviors on district-issued devices, such as Chromebooks and iPads, can decrease time and effort spent on assigned tasks (Perry & Steck, 2015; Sahin et al., 2016). While teachers and school leadership express a desire for expanded digital learning opportunities, they also express frustration with off-task device use (Aagaard, 2015; Andersson et al., 2014; Wood et al., 2011). School administrators, teachers, and device oversight systems cannot control all student device use. Developing students' control of self in the form of SRL supports independent task focus and personal metacognitive growth (Center for Applied Special Technologies, 2011; Cleary & Zimmerman, 2004; Paris & Paris, 2001; Zimmerman, 2002). Implementing performance

control strategy instruction as an intervention for task-related device use focuses on metacognitive learning strategies to bridge cognitive practices with instructional technology and furthers potential gains from technology's use in an academic setting.

Purpose Statement

The purpose of this action research was to evaluate the impact of digital learning logs to support self-regulated learning (SRL) for high school students of average achievement who have individual access to digital connectivity within the classroom.

Research Questions

The grand tour research question for this study was: How will SRL strategy support impact student device use? The specific questions explored are:

1. How and to what degree does SRL strategy support affect metacognitive SRL skills?
2. How and to what degree does SRL strategy support affect performance control?
3. How do students describe the impact of SRL strategy support on their task-related device use?

Researcher Subjectivities and Positionality

As a public educator, I view my societal position as one to improve the education of as many students as possible. I continue to push my education to enhance theirs. I overcame my own educational at risk factors as a first-generation college student, in a family with inconsistent high school completion, and a lack of financial support for higher education. While these factors can connect me to many students, they have also hardened my worldview. It is difficult for me to understand why students choose to remove themselves from formal education before obtaining a degree, preferably a post-

secondary degree. In many challenging cases beyond what this brief overview entailed, I feel like I have been through trials and persevered.

Just as I have not shared all the details of my life, I recognize my students will not either. My status as a white, married, Christian adult with two children drastically limits my experiences as a minority. Being a female Southerner places me in the minority in some contexts. To say, "I have been there" is just not true. I can relate; I hopefully can inspire, but I should not judge or claim to know best. While I seek to be as knowledgeable as possible, I frequently use technology to find answers and to implement and validate solutions that are often technology-based. My drive to solve problems has to be checked by an awareness of limitations with technical skills, accessibility, levels of experience, and regulations. I consistently push for the betterment for students; I just have to be aware of my predispositions and limitations as I further refine my mindset of what better is.

With low academic achievement being a primary influence for students to discontinue education, I focus on interventions that support or enhance academic performance. I see value in SRL as a pathway to perseverance due to its rooted nature in goal-orientation and self-implementation and refinement of strategies to achieve those goals (Zimmerman, 2002). Through my research, I wanted to learn more about and experiment with providing instruction for SRL. Simultaneously, teacher reports and related research demonstrate performance declines due to student task-switching and multitasking while using devices in classroom settings (Preston et al., 2015; Wood et al., 2012). As a problem-solver seeking long-term student betterment, researching SRL

principles in a setting with a one-to-one device to student ratio aims to test a method for supporting multiple groups of stakeholders in my sphere of influence.

Crafting and application of this research will occur under the pragmatist paradigm. Axiology of pragmatism values these researcher's goals (Mertens, 2009). My paradigm and goals drive my research study by emphasizing action and inquiry related to student device use. Ontologically, multiple viewpoints of participants were useful for developing understanding and contributed to making recommendations that are aligned and purposeful (Frels & Onwuegbuzie, 2013). My line of inquiry further demonstrated pragmatism's epistemology by valuing participants' experiences through quantitative and qualitative data collection and comprehensive review. Continuing alignment to the pragmatist paradigm, I sought to appropriately use mixed methods by bringing together researched and established principles and measures of SRL with experiences of participants in the study (Mertens, 2009).

I attempted to reduce my power of influence from being an assistant principal by positioning myself as an insider in collaboration with others, both inside and outside my setting (Herr & Anderson, 2005). Collaboration with on-site teachers structured the intervention to reduce potential fears of evaluative consequences from participating or not participating in this research. The inclusion of consenting student and teacher participants in the data collection and review helped to ensure that their voices and experiences were ethical and accurate. In situations where removing myself from the setting further reduces the impression of power, I sought to collect data or alternately provide instruction. True to action research, I was not experimenting on these individuals,

but was trying to work with them to impact a positive outcome and create change together (Manfra & Bullock, 2014; Mertler, 2017).

Definition of Terms

Effort regulation: Effort regulation is the "tendency to maintain focus and effort toward goals despite potential distractions" (Corno, 1994, p. 229). Effort regulation, also known as volition, is a domain of SRL specific to performance control (Boekaerts & Corno, 2005).

Digital learning log: Google sheet used by individual students to document daily goals, reflections, and next steps for learning

Half-Time: A daily, one hour personal enrichment period built into all students' schedules to provide opportunities for tutoring, reassessment, meetings, or other needs determined by students and teachers. Lunch occurs during this time.

Metacognitive SRL: Awareness, knowledge, and control of cognition to improve learning performance (Pintrich et al., 1991).

Performance control: A phase of the SRL cycle when students monitor and direct their learning toward completing a task (Cleary et al., 2012, p. 6). Self-control and self-observation are the primary processes used to support performance control (Cleary & Zimmerman, 2004).

Self-Regulated learning (SRL): Metacognitive, motivational, and behavioral direction of one's learning toward set goals (Paris & Paris, 2001; Zimmerman, 1989).

Self-Regulation: Behavioral and cognitive self-control to support goal attainment (Bandura, 1986).

Task-related device use: Use of device (laptop, tablet, computer, phone) for purposes related to completing an assigned task. Objectives can be directly related, such as following instructions or working within an assigned application, or indirectly

related, such as research or communicating about the task. For this research, task-related device use is the observable manifestation of effort regulation while students are using computing devices.

CHAPTER 2

LITERATURE REVIEW

The purpose of this action research was to evaluate the impact of digital learning logs to support SRL for high school students of average achievement who have individual access to digital connectivity within the classroom. Questions used to inform this research are: (a) how and to what degree does SRL strategy support affect student metacognitive SRL, (b) how and to what degree does SRL strategy support affect performance control, and (c) how do students describe the impact of SRL strategy support on their task-related device use. All of these questions informed the primary research question: how will SRL strategy support impact student device use.

For locating resources, the University of South Carolina EBSCOhost advanced search is used to select multiple databases to pull the most relevant, peer-reviewed, and recent journal articles and book chapters. Selected databases focus on education or psychology. They include *Academic Search Complete, Computer Source, Education Full Text, Education Source, ERIC, Professional Development Collection, Psychology and Behavioral Sciences Collection, PsycINFO,* and *Teacher Reference Center*. Primary keywords for the main searches are "self-regulat*" and "education* technology." "Education* technology" was traded out for "1:1", "one-to-one," "Chromebook*," and "BYOT." Additional qualifiers include "high school," "secondary school*," "adolescent*," "MSLQ," and "effort regulation scale.", Search methods for digging deeper into the performance control phase occurred by replicating "self-regulat* were

replicated while substituting “performance control,” “effort regulation,” and “volition.” Peer-reviewed criteria were always selected. When searches return over 250-300 results, terms are filtered to appear in the abstract to increase the primary focus of the study to key phrases. When articles by authors are relevant, the author's name was selected to pull all works by the author to see if there are more recent studies of relevance. Results were sorted by year, beginning with the most recent, to better support using references that are most current on the topic. When book chapters needed were not digital, the full-text finder feature was used to locate the text for interlibrary loan or scan dependent on what the library makes available. Some chapters were digitized via a scan to.PDF app and then loaded to Google Drive and Mendeley.

Additionally, the same advanced search procedures were used with *ProQuest Dissertations & Theses Global* to review recent relevant dissertations. All resources were legally obtained, stored, and cited. The synthesis of ideas presented here was generated in good faith to be an accurate representation of the works of the authors reviewed.

Two primary sections organize the review of this literature. The first section provides an in-depth look at SRL. The second section reviews SRL in classrooms with low student to computer ratios. These sections are (a) SRL and (b) SRL in classrooms with low student to computer ratio.

Self-Regulated Learning

SRL is critical to this research because it focuses on the use of processes to increase learning efficiency. This section provides information about SRL as it relates to (a) theory, (b) measures, (c) SRL strategy instruction and (d) volitional strategies for performance control.

Theory

SRL draws from social cognitivist theory to specify sub-processes individuals use to maximize self-control through the use of effective strategies. In education, student development of SRL as a non-curricular skill supports curricular success. Components of SRL literature to be reviewed include: (a) definition, (b) theoretical grounding, (c) academic performance, and (d) strategies.

Definition. Self-regulation occurs from the processing and optimization of self-control and goal attainment (Bandura, 1986). SRL focuses on the use of internal and external organization and self-direction to support learning goal attainment (White & DiBenedetto, 2018). This optimization supports an emphasis on thinking processes including, "metacognitive, meta-motivational and meta-emotional strategies to modify behaviors into goals" (Pellas, 2014, p. 161). Optimization of thinking processes requires acting upon knowledge gained from self-reflection (Zimmerman, 2002). Ultimately, SRL occurs at the intersection of metacognition and motivation (Paris & Paris, 2001). Simply put, SRL occurs when thinking and doing support achievement of an individual's learning goals.

Theoretical ground. Overall, people are not inherently adept in SRL; development is a process (Schunk, 2001; Zimmerman, 2011). The social cognitivist theory asserts that people can be intentional actors in their development (Bandura, 1986). Bandura (2001) notes theory influences from earlier learning theories of constructivism, where learning occurs from interaction with a task (Piaget, 1954) and social constructivism, where influences on learning develop from social and environmental variables and proximal goals (Vygotsky, 1978). From these influences, social cognitivism

ties to SRL as personal development through social and behavioral functions from three intentional sub-processes: self-observation, self-judgment, and self-reflection (Kitsantas & Cleary, 2016; Schunk & DiBenedetto, 2020; Zimmerman, 1989). Development of these phases includes goal setting and planning (i.e., forethought), strategy implementation and self-monitoring (i.e., performance control), and evaluating actions to determine if adjustments are needed (i.e., self-reflection) (Cleary & Zimmerman, 2004; Zimmerman, Schunk, & DiBenedetto, 2015). Figure 2.1 displays the SRL cycle.

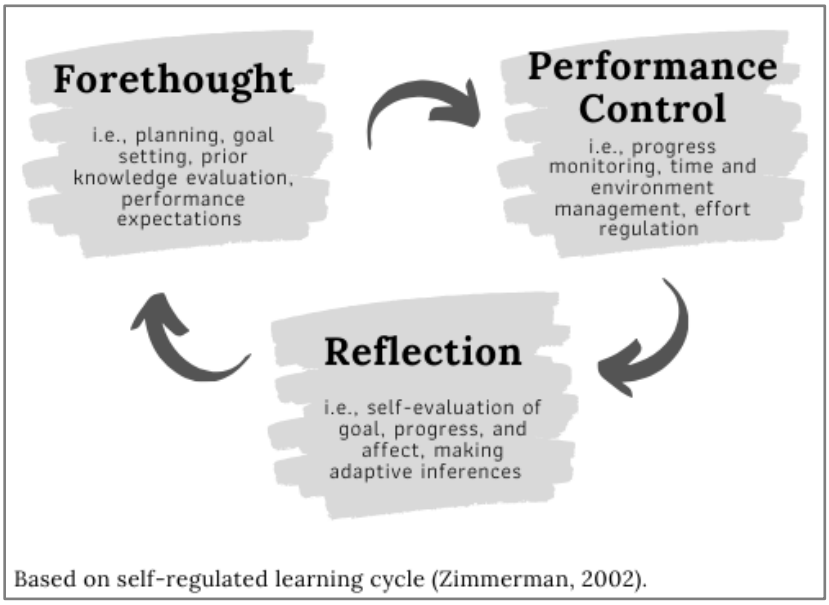


Figure 2.1. SRL cycle.

Ultimately, individuals cycle through forethought, performance control, and self-reflection phases to experience autonomy with learning (Usher & Schunk, 2018; Zimmerman, 2002). By blending social constructivist theory with a practical process, SRL brings learning theory to real life in an approachable way.

Academic performance. SRL blends personal choices for cognitive, motivational, and emotional behaviors to support decision making for goal achievement (Pellas, 2014; Paris & Paris, 2001). Particularly tying to an interest in academic

performance, metacognition emphasizes a learner's ability to use strategies for planning, monitoring, and self-evaluation during learning (Brown et al. 1983; Tock & Moxley, 2016). For instance, metacognitive SRL strategy development through practicing time management planning and goal analysis improved high school students ability to plan for and manage learning activites during class (Deekens et al., 2018; Green at al., 2015). Overall, by targeting the metacognitive SRL elements, student learning performance is enhanced through increased awareness, knowledge, and control of cognition (Pintrich et al., 1991).

Furthermore, guiding student development through instruction in SRL strategy use is helpful for academic support and standardized achievement when students are challenged in course work (Chen et al., 2018; Schlüter et al., 2018; Wagaba et al., 2016; Zimmerman, 2011). Tying to Vygotsky's (1978) zone of proximal development theory, the use of self-reflection allows a student to conceptualize a more favorable level of performance, set goals to achieve that level, perform, and reflect for continuous improvement. In this way, students depend on SRL to navigate course work that is challenging or unstructured (Miller & Bernacki, 2019; Zimmerman & Martinez-Pons, 1986). Additionally, a student's use of SRL strategies is a predictor of standardized achievement test scores (Cleary et al., 2017; Zimmerman & Martinez-Pons, 1986; Zimmerman & Kitsantas, 2014). Facilitating a learner's use of SRL strategies supports educational goals for student academic growth.

Strategies. SRL strategies can be taught in classrooms and include the following categories: self-evaluating, organizing and transforming, goal-setting and planning, seeking information, keeping records and monitoring, environmental structuring, self-

consequence, rehearsing and memorizing, seeking social assistance, and reviewing records (Hoyle & Dent, 2018; Karabenick & Gonida, 2018; Zimmerman, 1989). These categories focused on developing students to be adaptive, persistent, self-controlled, strategic, and goal-oriented (Paris & Paris, 2001). Strategies specific to performance control include self-management of thinking, effort regulation, keeping records and monitoring, and self-consequence. (Zimmerman, 2011). Strategies to support self-management include: setting appropriate goals, managing time and resources, and reviewing one's learning (Pairs & Paris, 2001; Zimmerman, Schunk, & DiBenedetto, 2015). Strategies for monitoring task situations and task settings include: changing the task itself, making subgoals, self-imposed rewards and punishment, asking permission to move from peers, motivating self and others, selecting positive peer grouping, and avoiding reference to past failures (Corno, 2001; McCann & Turner, 2004). Strategies for effort regulation include: staying focused on the problem and intentionally protecting the intention to learn when conditions become difficult (Boekaerts & Corno, 2005; Kim & Bennekin, 2016). The overall use of self-assessment for the development of SRL will include reflection and evaluation regarding the implementation of strategy options to develop student ownership of choices and responsibility for learning.

Measures

Measures for SRL include surveys, questioning, and interviews. These measures classify into the following categories: (a) quantitative and (b) qualitative.

Quantitative. Motivated Strategies for Learning Questionnaire (MSLQ) is a domain-specific instrument for assessing motivation based on a student's goals and beliefs about a class. Specifically, this measure divides scales into two primary

subgroups: motivation and learning strategies. The learning strategies section includes items about cognitive and metacognitive strategies, as well as student management of resources. The scales are designed for use together or separately and should take 20-30 minutes in class to complete (Pintrich et al., 1991). The Metacognitive Self-Regulation Subscale (MSRS) of the MSLQ is a subscale for metacognitive component of SRL (α = .79). More recently, an analysis of the instructed was conducted and has reported updated reliability for subscales MSRS (α = .76), time and environment management (α = .79), effort regulation (α = .77) (Broadbent & Fuller-Tyszkiewicz, 2018). This instrument has been used in educational technology research by Edens (2009), Shyr and Chen (2017), Sletten (2017), Shea and Bidjerano (2010), and Terry et al. (2016). Additionally, Peck et al. (2018), Poot et al. (2017), and Shea and Bidjerano (2010) use the Effort Regulation/Volition subscale (α = .69) in an educational technology setting. Table 2.1 reflects measures, data purpose, and references for studies that have implemented the measure for evaluation of SRL.

Qualitative. Two qualitative measures have been specifically crafted, implemented, and evaluated for use with SRL research: (a) SRL Interview Schedule, and (b) Microanalytic Questioning Protocol. Table 2.1 also includes these qualitative sources.

SRL Interview Schedule. The SRL Interview Schedule is an interview protocol used to provide students a format for open responses about the use of SRL strategies (Zimmerman & Martinez-Pons, 1986). With an open-response method, students are not provided answers, resulting in responses with a more real-life context. Conversely, without an answer pool, recall about specific strategies and implementation may be forgotten. The use of these questions in interviews or focus groups can provide additional

qualitative data about the use of SRL strategies. Later studies used the SRL Interview Schedule to gather specific details about the use of motivational regulation strategies (Metallidou, 2013; Vandevelde et al., 2011). Through the use of consistent questions specific to SRL strategy use, detailed information generates to provide insight into learner development.

Microanalytic Questioning Protocol. The Microanalytic Questioning Protocol is used to ask questions during the performance phase of SRL to focus on whether students strategically engage in self-directed learning (Cleary, 2011; Cleary et al., 2012; DiBenedetto & Zimmerman, 2013). Questions also include whether the student keeps track of, or monitors, the rate of learning progress for completing a task (Cleary et al., 2012). Unfortunately, asking questions during performance can be invasive to student learning and task performance. When structuring microanalytic protocols, it is critical the assessment tool function as a support during the intervention and not a hindrance (Panadero et al., 2016). While real-time data gathering of metacognitive processes is a desirable goal, the use of this qualitative measure requires great caution.

Table 2.1 *Measurement, Data Purposes, and References for Evaluation of SRL*

Measure	**Data Purpose**	**Reference**
MSLQ	Quantitative: Assesses learner motivation based on student's goals and beliefs about a class	• Edens (2009) • Hodges & Kim (2010) • Pintrich et al. (1991) • Sletten (2017)
MSRS	Quantitative: Measures use of metacognitive strategies to support SRL	• Edens (2009) • Shyr & Chen (2017) • Shea and Bidjerano (2010) • Terry et al. (2016)

Measure	Data Purpose	Reference
Effort Regulation subscale of the MSLQ	Quantitative: Measures use of volitional strategies to support SRL	• Peck et al. (2018) • Poot et al. (2017) • Shea & Bidjerano (2010)
SRL Interview Schedule	Qualitative: Provide students a format for open responses about the use of SRL strategies	• Metallidou (2013) • Vandevelde et al. (2011) • Zimmerman & Martinez-Pons (1986)
Microanalytic Questioning Protocol	Qualitative: Ask questions during the performance phase to focus on student's strategic engagement and self-direction	• Cleary (2011) • Cleary, Callan, & Zimmerman (2012) • DiBenedetto & Zimmerman (2013)

SRL Strategy Instruction

SRL strategy use increases through instruction and feedback. This section will review (a) SRL instruction and (b) impact of SRL instruction.

SRL instruction. When providing instruction in SRL, it can be taught via direct instruction, discussion, directed reflection, and practice with experts (Chamot, 2018; Cleary & Zimmerman, 2004; Griswold & Ruckert, 2018; Schunk et al., 2018). Cleary & Zimmerman (2004) developed the Self-Regulation Empowerment Program, a training program used by school professionals with adolescent students to engage in more positive, self-motivating cycles of learning. Coaching is used as an instructional model and occurs in a three-step process of empowerment, strategy instruction, and then personal implementation of the SRL cycle (Cleary et al., 2017). Implementation of the program format aligns with student-centered learning models as the program "seeks to reduce student passivity by shifting the responsibility for the problem-solving process from the professionals to the students" (Cleary & Zimmerman, 2004, p. 540). Overall,

modeling and embedding reflection promotes SRL concepts indirectly, while the use of charts and discussion provide students evidence of implementation (Griswold & Ruckert, 2018; Schunk et al., 2018).

Structured diaries and time-series data used in other studies assess the impact of SRL strategy instruction. For instance, prompts provide similar coaching sequence as Self-Regulation Empowerment Program (Cleary & Zimmerman, 2004) to include the lesson's learning goal, student's plan to achieve that goal, student's thoughts of progression through the plan, types of breaks taken, and if any distractions were present (Fabriz et al., 2014; Panadero et al., 2016; Schmitz & Perels, 2011; Schmitz & Wiese, 2006). By maintaining a structured diary, responses are timely, student-centered, and support substantial documentation of strategy implementation (Schmitz & Wiese, 2006; Schunk, 2001). Additionally, learners can be provided with feedback about responses to support continuous improvement. Structured diaries offer students an opportunity to share reflections about task choices, focus, and metacognition, without invading learning performance during the lesson (Panadero et al., 2016). A structured diary coaching cycle provides time-series qualitative data for implementation and analysis through the process of self-observation of SRL.

Impact of SRL strategy instruction. Overall, findings document students who utilized self-reflection were more effective with time management on tasks in the future (Boekaerts & Corno, 2005; Cleary et al., 2012; Cleary & Zimmerman, 2004). For instance, students who used reflection to determine future actions or setting choices, also improved future task performance (Chen et al., 2018; Cleary et al., 2017; Cleary & Zimmerman, 2004). Additionally, students who developed smaller SRL cycles within a

more substantial task reported setting additional goals to adjust methods for increased performance (Cleary et al., 2018; Wilson & Narayan, 2016). Other reports include a decrease in helplessness and an increase in effort, interest, and focus on learning goals as reported by teachers (Boekaerts & Corno, 2005; de Palo et al., 2017; Stoeger & Ziegler, 2008). For school leaders and teachers seeking increased engagement with content and tasks, impacting student self-management occurs through SRL strategy instruction.

SRL studies regularly note increased self-management, while the positive academic impact is more context-dependent and mostly observed in studies that provide active learning opportunities (Pennypacker-Hill, 2013; Schunk, 2001; Sletten, 2017). Regarding SRL strategy instruction, Sletten (2017) found no academic impact in passive learning settings, while Pennypacker-Hill (2013) found collaboration and reflection opportunities critical for students who demonstrated increased academic achievement. Due to students' individual responsibilities to self-direct in the performance control phase of SRL, active learning options may provide students opportunities to implement SRL more authentically. As such, studies finding no academic impact in passive learning settings may not be fully allowing SRL processing to develop (Schunk, 2001). While a lack of educational impact may signify limitations, it is difficult to fault SRL strategy instruction when some instructional choices are not conducive to the authentic processing SRL requires.

Volitional Strategies for Performance Control

Performance control, the focus of this research, is the second phase in SRL. Performance control phase of SRL is defined as when students "actively engage in a specific learning activity and employ self-control and self-observation processes to

maximize their learning" (Cleary & Zimmerman, 2004, p. 539). Training for individual development of self-monitoring and self-control is critical to the development of autonomous learners because in learning environments with choice, students have the option to waiver in commitments (Corno, 2001; Hoyle & Dent, 2018). Volition, or application of personal will, is important to instructional settings because while a teacher can directly prompt phases of forethought and reflection, choices students make while working are less in a teacher's control. In this way, students productively focusing on a learning task, or having positive volition for learning, is the pivotal lever to move from planning to achievement (Boekaerts & Corno, 2005; Hoyle & Dent, 2018; Kim & Bennekin, 2016). Interventions involving instruction in strategies to support performance control can support the development of volition for learning and enhance motivation, furthering overall SRL skills (Broadbent & Poon, 2015; Kim & Keller, 2010; Schlüter et al., 2018; Zimmerman, 2011). Strategies to support performance control include (a) task and thinking management, (b) effort regulation, and (c) monitoring affect (Zimmerman, 2002).

Management of tasks and thinking. Management of thinking and tasks are the most immediately evident elements of performance control due to their relationship with the plans developed in the forethought stage of SRL. Strategies to support management of thinking include protocols or prompts for self-questioning about the task or content, determining the problem and prior understanding, seeking needed information, managing resources, and progress monitoring understanding (Chen et al., 2018; Cleary et al., 2017; Deekens et al., 2018; Karabenick & Gonida, 2018). Strategies for monitoring task situations and task settings include: changing the task itself, making subgoals, monitoring

use of time, self-imposed rewards and punishment, asking permission to move from peers, motivating self and others, selecting positive peer grouping, and avoiding reference to past failures, with a particular focus on supports needed for goal achievement (Corno, 2001; McCann & Turner, 2004; Verstege et al., 2019). Through task and thinking management, performance control enhances goal attainment.

Effort regulation. Effort regulation ties to student's motivation to exert the effort needed to achieve plans developed in the forethought stage of SRL. Concepts presented in volitional strategy instruction are focused on protecting goals set by the learner (Boekaerts & Corno, 2005; Corno, 2001; Shea & Bidjerano, 2010). Self-monitoring of time, resources, goal achievement, and task completion focuses on learner commitment when distractions in the learning environment arise or mental interest shifts (Corno, 2001; McCann & Turner, 2004). Boekaerts and Corno (2005) refer to the implementation of this strategy as *problem-focused coping* (p. 205).

Strategies for effort regulation include: staying focused on the problem and intentionally protecting the intention to learn when conditions become difficult (Boekaerts & Corno, 2005; Kim & Bennekin, 2016). When learning setbacks occur, effort regulation is developed to deal with the setback and persist in the process of completing the learning task (Shea & Bidjerano, 2010; Zimmerman & Kitsantas, 2014). Additionally, opportunities for autonomy through pace, choice, and emphasis on personal goal setting promote effort regulation (DeVore et al., 2017; Flunger et al., 2019). When students utilize self-monitoring to protect goal attainment, final completion of tasks will better reflect content knowledge and skills than the influence of affect or environmental distractions.

Monitoring affect. Affective responses are continuous during the learning cycle. Positive affect toward task and learning enhances student outcomes, while negative affect reduces effort and outcomes (Broadbent & Poon, 2015; Efklides, 2017; Zimmerman et al., 2015). The strategy supports for increasing positive affect includes prompts for self-check of mindset, considering other perspectives about the task, using planning documents or actions plans to evidence progress, create smaller, more quickly attainable subgoals, and implementing teacher support for co-development of individualized management plans for students with negative affect (Azevedo et al., 2017; Efklides et al., 2018; Spann et al., 2019). Through the implementation of affect management strategies, other performance control strategies focusing on task and learning management can be more effective for overall student outcomes.

In summary, while training for performance control, it is important to relate strategy use to problem-solving, self-control, and strategic accomplishment of set goals so that learning focus can stay central to student practice (Paris & Paris, 2001; Zimmerman, 2002). Underlying motivational and management components of effort and affect must also be monitored and supported with intervention strategies when needed (Schunk & DiBenedetto, 2020). When students further develop volition for learning to support performance control, the other phases of the SRL cycle (i.e., forethought and reflection) can be used to target identified detractors and support the achievement of goals.

SRL in Classrooms with Low Student to Computer Ratio

An increase in student access to devices during class is lowering student to computer ratios. This change is increasing due to personal ownership and issuing by

school districts, in some cases to the point of a one-to-one student to computer ratio. SRL strategies can be used in classrooms with low student to computer ratios to impact student engagement with learning tasks. This section will include a review of (a) low student to computer ratio, (b) strategy implementation for performance control in learning environments with low student to computer ratio, and (c) calls for additional research.

Low Student to Computer Ratio

Low student to computer ratios provide new tools for teachers and learners, but also new challenges including: (a) distraction, (b) academic impact, (c) implementation of SRL strategies in classrooms with a low student to computer ratio.

Distraction. Increased technology access in the classroom is not a fix-all for learners. Reliance on technology for engagement without a learning purpose can result in decreased student interest and participation, increased distraction, and increased complexity of content dissemination without any additional learning gains (Kulesza et al., 2011; Nworie, & Haughton, 2008). Students report that experiencing extremes on both ends of cognitive load makes the allure of easy to access, off-topic materials very attractive (Deimann & Keller, 2006). High cognitive load is reported when students are interacting with complex material or a hard to understand task structure when working on a device (Aagaard, 2015; Stebner et al., 2019). Conversely, material that is easy to or has already been mastered will quickly be dismissed for personal selections available on individual devices (Aagaard, 2015; Deimann & Keller, 2006; Fried, 2008). Experiences with low student to computer ratios have resulted in teachers expressing the need for students to have training in SRL strategies like time management (Deimann, & Keller, 2006; Tagsold, 2013). SRL and cognitive load tie together to balance strategy with theory

supporting productive student learning (Boekaerts, 2017; Seufert, 2018; Sweller & Paas, 2017). Through the development of student SRL strategy use, the adverse effects of high cognitive load in low student to computer ratio classrooms could be mitigated.

One common theme among the district lead computing device integration programs is student engagement as a stated purpose for device implementation (Perry & Steck, 2015; Preston et al., 2015; Sahin et al., 2016). When devices with networked resources have been issued by school districts, such as iPads or Chromebooks, students have demonstrated increased off-task behavior and no significant change in academic achievement (Perry & Steck, 2015; Preston et al., 2015), while teachers express disappointment, technological problems, and distractions (Chou et al., 2012; Sahin et al., 2016). Similar to SRL studies (e.g., Pennypacker-Hill, 2013; Schunk, 2001; Sletten, 2017), instructional elements for active learning are central to engagement with learning processes. Instructional formatting plays an essential role in successful device implementation.

Academic impact. Technology use in classrooms where students have open access to devices can be detrimental to focus on learning activities and learning outcomes (Andersson et al., 2014; Durak, 2018; Perry & Steck, 2015). Students report accessing social media in school is distracting to their learning, while teachers echo students are not meeting learning objectives (Andersson et al., 2014). Personal social media access and use in the classroom resulted in reported increases in social anxiety and academic procrastination, while SRL decreased (Andersson et al., 2014; Durak, 2018; George et al., 2018). Students who bring their own devices to access content, take notes, and create learning products, without any additional technology integration planning by the teacher,

report increased engagement but no increase in academic performance (Duncan et al., 2012; Fried, 2008; Rashid & Asghar, 2016). Additionally, the academic impact of open access is not only limited to student-owned technology. Devices disseminated by the classroom teacher also resulted in increased off-task behaviors and decreased mean proficiency when compared to control (no device) groups (Perry & Steck, 2015). Device implementation in classrooms without effective strategies can be detrimental to academic outcomes.

More specifically, student academic achievement in core content classes is not significantly affected by the introduction of one-to-one student computing (Bebell & Kay, 2013; Harris et al., 2016; Williams & Larwin, 2016; Wood et al., 2012). Some subgroups, such as those who previously did not have the internet at home, did see a positive impact in reading and mathematics achievement after receiving access at home (Williams & Larwin, 2016). English achievement increased for students with two years or more of implementation, while those in year one of implementation saw a negative effect (Bebell & Kay, 2013). Additionally, a small effect was noted in physics where simulations and interactive spreadsheets for data analysis were used (Crook et al., 2015). In the lecture setting, students who did not use any technology outperformed those engaged with digital technologies on a post-lecture learning assessment (Wood et al., 2012). Overall, conditions of device implementation impact academic effect.

Implementation of SRL strategies. By providing direct instruction, embedding prompts and generating individualized feedback; teachers can create instructional features to support SRL in low student to computer ratio learning environments (Dresel & Haugwitz, 2008; Green et al., 2015; Shyr & Chen, 2017; Wilson & Narayan, 2016).

Computer-based SRL strategy instruction led via video has been used to provide students with guidance on strategies during flipped and blended learning. By conducting the instruction digitally, the program also recorded strategy use and shared feedback (Dresel & Haugwitz, 2008; Moos & Stewart, 2018; Wilson & Narayan, 2016). Aside from direct instruction, students have been provided computer-generated prompts for goal-setting, self-monitoring, and reflection while completing course work on devices (Deekens et al., 2018; Edens, 2009; Pennypacker-Hill, 2013; Shyr & Chen, 2017). In a meta-analysis, Zheng (2016) reported a consistent positive effect of computer-based scaffolds on SRL and achievement. Paris and Paris (2001) remind those planning for the use of SRL strategies in classrooms that activities used must support student opportunities for initiative, choice, and independence. When planning for SRL development, the use of direct, interactive, and responsive instructional features drive student growth.

More specifically, the use of computer-based video instruction for SRL strategies was more effective for knowledge acquisition and engagement with learning compared to a conventional flipped classroom, as measured by the MSLQ (Dresel & Haugwitz, 2008; Edens, 2009; Shyr & Chen, 2017). Attitudes and motivation toward the learning model can be enhanced through student collaboration and individualized feedback (Moos & Stewart, 2018; Pennypacker-Hill, 2013). Additionally, student attitudes about a computer-based learning model positively predicted the use of SRL strategies (Poitras & Lajoie, 2018; Sletten, 2017). By supporting a student's active contributions to learning through digital SRL instruction, greater positive outcomes align with positive findings from more traditional, non-digital instruction that also focused on active learning strategies for SRL development (e.g., Cleary & Zimmerman, 2004; Schunk, 2001).

Whether taught through computer-based instruction or traditional instruction, active learning where student performance is required is a critical element for the development of SRL when academic improvements are a goal.

Strategy Use for Performance Control with Low Student to Computer Ratio

Implementation of performance control strategies in learning environments with a low student to computer ratio requires commitment from two primary areas: (a) teacher leadership and (b) student awareness.

Teacher leadership. Teacher commitment to creating lessons where students have opportunities to perform, interact, and test SRL development is needed for quality implementation of a student's performance control strategies. Teachers can create engaging lessons, implement active monitoring, lead consistent member check-in with a partner or team debriefing about goal attainment within set deadlines (could be embedded in the video, set up as a discussion board, or prompted through messaging), and provide online submission and grading (Kim & Keller, 2010; Sletten, 2017; Tagsold, 2013; Wilson & Narayan, 2016). During debriefing with students, teacher provided reflection prompts can focus students on noted distractions that arise during active monitoring, as well as taking student contributions for unobservable distractions (Kim & Keller, 2010; Terry et al., 2016). Students who received personal messages about belief change and volition strategies from their teachers had positive trends in attitude toward their subject area and study habits (Kim & Bennekin, 2013; Kim & Keller, 2010), compared to no statistically significant effect when personalization is only the use of a student's name (Hodges & Kim, 2010). Teachers seeking to lead students in the development of

performance control will need to include instructional elements beyond a traditional content acquisition focus.

Student awareness. Active elements like member check-in, self-observation, and self-monitoring engage a student with metacognitive and motivational components of learning (Kim & Keller, 2010; Terry et al., 2016; Wills & Mason, 2014). Learning goal awareness will be critical as students will need documented goals and a task list to use for member check-in and progress monitoring (Wills & Mason, 2014; Zimmerman, 2011). Students can implement self-observation to document distractions and attitudes during learning sessions to provide better feedback during member check-in sessions (Kim & Keller, 2010; Terry et al., 2016). Additionally, through the use of self-monitoring, students report reminding themselves of their goals and noting outside distractions as key influences for staying on task during class (Tagsold, 2013; Terry et al., 2016; Wills & Mason, 2014). Content knowledge and SRL develop in concert when student self-awareness directs performance control.

Additional Research Requests

Even in the success of prior studies, more research is sought after in the field. Calls for research with secondary students and specific to task focus are common (Corno, 1993; Zimmerman, 2002). With current technological advancements, additional focus on managing distraction is desired (Pennypacker-Hill, 2013; Wilson & Narayan, 2016). “No known studies have empirically considered student-held metacognitive awareness in concert with technology use or preference for multitasking” (Terry et al., 2016, p. 243). Recent studies from leading voices in the field of SRL, including Schunk & DiBenedetto (2020) and Winne (2017), state the next phase of research should focus on technology

that promotes SRL through the use of learner data. An opportunity is available for educational technology research focused on developing learners' use of SRL skills, particularly in the active phase of performance control, to support achievement while connected device access increases in classrooms.

Summary

This literature review has provided (a) an overview of SRL and (b) a look at SRL in classrooms with a low student to computer ratio. The basic principle of SRL stated that self-regulation is where motivation meets metacognition (Paris & Paris, 2001). When student device implementation seeks only to increase student engagement, it has missed the metacognitive mark for its teachers and students. For instance, teachers report that student device use can be a distraction when metacognitive awareness is not brought into the curriculum to facilitate task-related device use (Kulesza et al., 2011; Perry & Steck, 2015; Sahin et al., 2016). In the SRL cycle, effort control during performance is the most oriented with directing behaviors that occur during task completion (Zimmerman, 2002). Implementation of volitional strategies for performance control has demonstrated increased SRL (Boekaerts & Corno, 2005; Corno, 2001; Shea & Bidjerano, 2010). Implemented strategies include time and resource management, prioritizing goals, and marking off tasks when they are complete (Boekaerts & Corno, 2005). Digitally, these strategies can be implemented as embedded prompts in the video, employed as a discussion board, or prompted through messaging (Kim & Keller, 2010; Sletten, 2017; Tagsold, 2013; Wilson & Narayan, 2016). As student to device ratios continue to decrease, expansion of previously conducted research and application of SRL strategies in these environments will help develop a useful knowledge base for practitioners striving

for greater task engagement and development of SRL skills observable through the manifestation of effort regulation while students are using computing devices.

CHAPTER 3

METHODS

The purpose of this action research was to evaluate the impact of digital learning logs to support SRL for high school students of average achievement who have individual access to digital connectivity within the classroom. Questions used to inform this research are: (a) how and to what degree does SRL strategy support affect student SRL, (b) how and to what degree SRL strategy support affect performance control, and (c) how do students describe the impact of SRL strategy support on their task-related device use. All of these questions were used to inform the primary research question: how will SRL strategy support impact student device use.

Research Design

My purpose as a researcher for this study is centered on the implementation and evaluation of a program to effect change within my professional practice. To conduct research within an appropriate methodology in this change-seeking and participatory role, action research as a research design model provided a fitting alignment of goals and design (O'Gorman & MacIntosh, 2015). The use of action research demonstrated this alignment due to its primary features of systematic and reflective inquiry by local practitioners to understand and make improvements in their own educational practice (Johnson, 2005; Mertler, 2017; Mills, 2011; Reeves & Oh, 2017).

Action research is set apart from many traditional research methodologies by conducting systematic inquiry through a local application (Mertler, 2017; Metz & Page,

2002). Such local scope seeks impact instead of expanding and generalizing educational theory (Reeves & Oh, 2017). However, because research is conducted in a systematic manner, documentation and data-collection make sharing outcomes with other practitioners possible. Mertler (2017) recommends practicing the following process: planning, acting, developing, reflecting, and cycling back to planning for continuous improvement. Systematic inquiry, participatory involvement, reflection, and local impact makes action research the appropriately aligned methodology for my research.

With local action being central to this study, the implementation of mixed methods allowed for research strategy selections and adaptations particular to my setting and research needs (Patton, 2002). In seeking to determine how strategy instruction will impact device use, both quantifiable measures of self and effort regulation were analyzed. Moreover, descriptive, qualitative information about task-related device and effort regulation strategies were collected through interviews and structured diaries. Both sets of data received equal emphasis to triangulate data around the constructs of effort regulation and task-related device use. Due to similar timing and emphasis on both types of data, my research design used convergent parallel mixed methods to capitalize on benefits from both quantitative and qualitative methods for understanding and triangulating results as they pertain to research questions (Creswell, 2013).

Setting and Participants

The study was conducted with participants from one AVID elective class of grade ten students at a small, rural, South Carolina high school with approximately 550 students. I conducted this research as a participant researcher at my school, where I serve as the assistant principal of instruction. I selected an AVID course for this study due to

the alignment of a program goal with a goal of this study; to advance student's personal ownership of learning in the face of challenges. The AVID block consists of a daily 45-minute AVID elective and a daily 45-minute content course taught by an AVID elective trained teacher. These courses are required courses for all students that have applied to and been selected for the AVID program. AVID elective provides students with strategies, support, and feedback for personal academic progress. For instance, students complete tutorials for core content classes twice weekly based on self-selected focus areas. They also complete weekly grade checks, goals setting, and reflection. The use of digital learning logs took these practices to a micro level focusing on one class, expanding to action steps, and directing reflection toward SRL daily. Note-taking, digital and notebook organization, and calendaring are other instructional topics geared toward supporting student academic success. A content class is partnered with AVID elective to provide instruction in the context of academic content with support from a trained AVID teacher.

For this study, the AVID elective is taught by one male teacher with 21 years of total teaching experience and two years of experience teaching AVID elective. Student interaction with digital learning logs will occur during the AVID content partner class, which for this study is economics. The economics partner class is taught by one female teacher with eight years of total teaching experience and one year of experience teaching AVID elective. This year-long course is taught during the third of four blocks from 12:15 p.m. to 1:45 p.m. This study was implemented during the third and fourth quarter of the school year due to typically stable enrollment numbers and feasibility of including the intervention into the curriculum at that time.

Students and teachers have networked resources, including access to the full suite of Google Apps for Education to support productivity on student issued Chromebooks. Web content filtering and oversight are administered with Hapara products. Google Classroom is used as a learning management system. In the AVID elective class, daily agendas, course work, and all digital assignments are available to the student within Google Classroom. Peer collaboration on Google documents allows for tutoring tailored to a student's actual work by providing comments and linking references to clarify points of confusion. Students digitally share Cornell notes, tutorial request forms, and weekly grade reports and reflection with their teacher. Additionally, the AVID elective teacher can coach students on digital course management by reviewing their digital course work from other classes when it is assigned in Google Classroom.

The class for this sample is comprised of approximately 14 students, nine females, and five males. They range in age from 15 to 16 years old. During Spring 2019, course enrollment will be 42% white, 42% African American, and 16% Hispanic. Participant GPAs range from 2.83 to 4.0. All of the participants were enrolled in honors or advanced placement level courses as a part of the AVID program. Selection for AVID requires students to be of average achievement determined by falling in the 25th to 75th percentile on national achievement tests, and a minority sub-group or first-generation college student. No students receive special education services. All students are on the college preparatory diploma track.

Students in the course, as well as their parents, were provided information about this study and given the option to consent and assent to participate. They were informed that anyone who did not participate would remain in AVID elective and receive no

penalty for lack of participation. Students or their parents were told they could have opted out of participation at any time with no effect on their course of study. All students and parents agreed to participate in the student. No one withdrew from the study or course during the research period.

All student participants received assessment questionnaires, digital learning logs, and feedback. Some students (9) were selected for interviews. The selection was based on the convenience of availability until data saturation was satisfied.

Innovation

The intervention provided to participants in this action research study included training on SRL and strategies to facilitate SRL, digital learning logs, and individualized instructor feedback to support students' SRL.

As the researcher, I provided the intervention, designed following the Self-Regulation Empowerment Program by Cleary and Zimmerman (2004), during the AVID elective class for six weeks. The intervention had a specific focus on SRL strategy use to support volition control through a three-stage SRL loop of forethought, performance control, and reflection (Zimmerman, 2001). During the initial overview phase, participants brainstormed common distractions that occurred while working on tasks with their school-provided devices. Each participant practiced creating a personal plan for setting goals and completing tasks. These plans will be referred to as *personal action plans*. The participant's personal action plans allowed him or her to set performance goals and document the forethought stage of SRL (Schunk, 2001).

After receiving the training on SRL, students received digital learning logs. Digital learning logs were used to provide a platform for personal action plans to promote

and document the components of the SRL cycle (i.e., forethought and reflection). These digital learning logs were generated through Google Sheets and shared with the student and researcher. Subsequently, students were directed to open individual digital learning logs at the beginning of the course daily. The learning objective and agenda were reviewed, and then the students generated a personal action plan for the day by typing that plan into the learning log. At the end of the lesson daily, students were directed back to their learning log to reflect on the goal set at the beginning of the lesson and to self-assess quantitatively with a rating and qualitatively with a reflection about personal use of SRL skills. Finally, students drafted the next steps, similar to an action plan, for success the next day. Students were directed to reference their personal action plans to determine positive steps for increased performance control. Every three days, as the researcher, I provided each student with individualized feedback based on entries submitted in the learning logs. The cycle continued for six weeks.

Stage two of SRL, performance control, occurred as participants executed their plans for volition control during work sessions. Additional performance control instruction occurred through the researcher provided feedback in the learning logs to support student planning for improvement of volition control strategies. Categories for volition control strategies feedback responses included control of cognition, emotion control, motivation control, control of the task, and control of the environment (Corno, 2001). The use of feedback is an appropriate instructional strategy to support student development by aligning to the appropriate learning context and allowing for demonstration of internalization of strategy use for performance control (Cleary & Zimmerman, 2004).

Stage three of SRL, reflection, occurred as students completed a daily reflection about performance control strategies used during their work session, the effectiveness of strategy use, and opportunities for improvement when a similar distraction arises in the future. These reflections were the basis for their learning log responses that provided qualitative data for analysis. Learning logs were the format used to implement the structured diary strategy allowing for the incorporation of self-awareness into classroom activities (Zimmerman, 2001). Learning logs played a primary role in this intervention by providing proximity and context to support participant self-observation and reflection. Additionally, accessing the provided feedback on reflection prompts, opportunities to edit personal action plans, and highlighting behaviors through participant identification further enhanced the cyclical model (Corno, 2001; Schunk, 2001; Zimmerman, 2001).

Data Collection

To answer the research questions, I used both qualitative and quantitative data collection methods. Specifically, I used survey, learning logs, and interview methods to gain a better understanding of the impact of my performance control strategy instruction and scaffolding on students' task-related device use (i.e., Chromebook). Table 3.1 reflects the data collection methods and their alignment to each research question.

Table 3.1 *Data Source Alignment*

Research Question	**Data Source**
RQ1. How and to what degree does SRL strategy support affect metacognitive SRL?	• Survey • Learning log • Interview
RQ2. How and to what degree does SRL strategy support affect performance control?	• Survey • Learning log • Interview

Research Question	Data Source
RQ3. How do students describe the impact of SRL strategy support on their task-related device use?	• Learning log • Interview

Furthermore, Table 3.2 reflects how each phase of the SRL cycle is supported by the innovation of digital learning logs and alignment to quantitative and qualitative measures used for data collection.

Table 3.2 *Connections of SRL Cycle Phases to Innovation and Data Collection*

SRL	Task Success	Digital Learning Log	MSLQ (81 Items)	Additional Aligned Data
Forethought	Planning	Goal setting Action plan	Selection of cognitive learning strategies (not tested)	
Performance Control	Monitoring and adjusting	Self-assessment of planning, learning, effort regulation and and resource management	Self and resource management (24 items) - MSRS - Time and environment management - Effort regulation	Interviews
Reflection	Determining how task achievement fits into the larger whole, the antecedent for self-adjustment and growth	Reflection	Motivation (not tested)	Interviews

In all, this section will present the following data collection instruments used in this research to include (a) MSLQ, (b) interview protocol, and (c) learning logs.

MSLQ

Pintrich et al. (1991) generated the MSRS (α = .79) of the MSLQ to measure metacognitive SRL strategies quantitatively (see Appendix A). Items of the 12-item subscale include, "During class time I often miss important points because I am thinking about other things" and "When I study for this class I set goals in order to direct my study activities" (Pintrich et al., 1991, p. 23).

The performance control phase within the SRL cycle was gauged with the Effort Regulation and Time and Environment Management subscales (see Appendix A). The MLSQ includes an Effort Regulation/Volition subscale with four items (α = .69). The four items used to assess effort regulation on the MLSQ refer to students' commitments to complete study goals when faced with difficulties or distractions (Pintrich et al., 1991). Items include statements like, "Even when the course materials are dull and uninteresting, I manage to keep working until I finish," and "I work hard to do well in this class even if I don't like what we are doing" (Pintrich et al., 1991, p. 27). Prompts were updated to reflect task-related Chromebook usage. Students responded to the statements using a 7-point Likert scale ranging from 1 (*not at all true of me*) to 7 (*very true of me*).

While effort regulation is internal regulation, the eight-item Time and Environment Management subscale (α = .76) measures a student's external management of the environment (Appendix A). This is especially important in one-to-one computing environments due to the often intrusive external stimuli that come from emails, messaging, posts, and the availability of task escape through the internet (Aagrard, 2016,

Wood et al., 2012). Items on this subscale involve effective use of time, setting, and goals. Items include statements like, “I make good use of my time for this course” and “I usually work in a place where I can concentrate on my coursework” (Pintrich et al., 1991, p. 25).

Using the MSRS subscale of the MLSQ instrument allows for analysis of outcomes from instruction and implementation of learning logs on overall metacognitive SRL skills, aligning to research question one (Table 3.1). Furthermore, subscales of the MSLQ provided targeted data for performance control in the form of the Effort Regulation/Volition and Time and Environment Management subscales, aligning with research question 2 (Table 3.1). To use the instrument to measure outcomes for research question one and two (Table 3.2), students completed the survey before and after performance control strategy instruction and learning log implementation. Students completed surveys anonymously with a participant ID so that pretest and posttest scores could be paired.

Interview Protocol

Interviews were conducted based on the SRL strategy interview procedure outlined by Zimmerman and Martinez-Pons (1986) for analyzing student use of SRL strategies. This interviewing procedure was selected based on its use with the Self-Regulation Empowerment Program research conducted by Cleary and Zimmerman (2004). Examples of questions to be asked of students include: “Teachers often assign their class the task of writing a short paper outside of class on a topic such as one’s family history. In such cases, do you have any particular methods to help you write the paper” and “What if you are having difficulty; is there any method you use” (Zimmerman

& Martinez-Pons, 1986, p. 619). For the purposes of my research, prompts were altered to reflect aspects of task-related Chromebook use (Appendix B).

Participants (n = 14) were divided into three smaller focus groups of three participants each. Focus groups were selected to prompt ideas and conversations among the participants (Mack et al., 2005). Interviews were conducted during Half-Time, a daily one hour lunch period that allows students to eat, participate in activities, and receive support or enrichment. Approximately 45-minute interviews were targeted to allow students time to get lunch and meet for the interview.

Selection for participation in the study was based on course alignment to participation study. Data were collected by me during all the interview sessions. All interviews were recorded with a digital recording device and transcribed for further analysis. Participants were provided copies of the transcript to verify accuracy.

Learning Logs

Structured diaries and time-series data have been used in other studies seeking to assess the impact of SRL strategy instruction (Schmitz & Perels, 2011; Stoeger & Ziegler, 2008). In these studies, students completed reflections about learning tasks based on prompts aligned to phases of the SRL cycle. For instance, prompts included what the lesson's learning goal was, how did the student plan to achieve that goal, how did the student think he progressed through the plan, what type of breaks were taken, and if any distractions were present (Schmitz & Wiese, 2006; Stoeger & Ziegler, 2008). Similar to this study, Panadero et al. (2016) described the use of structured diaries as an intervention and data collection tool due to their usefulness with prompting and documenting phases of SRL. In all, structured diaries have been used to enact participation in the SRL cycle,

and to demonstrate an increase in willingness to exert effort and focus on learning goal orientation.

Based on the outcomes aligning to my research goals and SRL phases, structured diaries were used to provide qualitative data for assessment of learner perspective. For the purposes of this study and to align with the terminology used in the AVID program, structured diaries were known as digital learning logs (Appendix C). Students self-assessed and responded to reflection prompts posted in the log that was shared within Google Drive. Reflection prompts were altered to reflect task-related Chromebook use. A Google Sheet was shared with me, as the researcher, and the classroom instructor to serve as the diary for recording responses to prompts.

Participants received coaching feedback on their reflections via a digital comment in Google Sheets, as is recommended in the Self-Regulation Empowerment Program model (Cleary & Zimmerman, 2004). Additionally, to ensure student engagement with and review of feedback, the tagging feature in Google Sheets was used to assign students the task of reviewing each feedback post. Response to the comment and initial reflections were analyzed for themes to answer research questions (Table 3.1). Additionally, changes over time or changes based on most recent strategy instruction were analyzed, resulting in additional support for the degree of influence. Student self-assessment and reflections were triangulated with interviews and survey data to determine the consistency of student responses and outcomes (Mertler, 2017). Since structured diary prompts targeted a focus primarily on performance control strategies, I will limit examination of the degree of impact to research questions related to performance control elements of effort regulation and time management (Table 3.1).

Data Analysis

Analysis of both quantitative and qualitative data gathered from varied data sources occurred to answer research questions. Table 3.3 reflects alignment among research questions, data sources, and analysis methods. The full description of quantitative and qualitative analysis methods are provided in chapter four.

Table 3.3 *Data Sources and Analysis Alignment*

Research Question	**Data Source**	**Analysis**
RQ1. How and to what degree does SRL strategy support affect metacognitive SRL?	• Survey • Learning log • Interview	• Descriptive statistics • Paired *t*-test • Wilcoxon Signed-Rank Test • Inductive analysis
RQ2. To what degree does SRL strategy support affect performance control?	• Survey • Learning log • Interview	• Descriptive statistics • Paired *t*-test • Wilcoxon Signed-Rank test • Inductive analysis
RQ3. How do students describe the impact of SRL strategy support on their task-related device use?	• Learning log • Interview	• Inductive analysis

Procedures and Timeline

The timeline for procedures for this research occurred in six phases, (a) preliminary requirements, (b) baseline data and information, (c) SRL cycle using access to digital support resources, (d) data collection concurrent to student development, (e) data collection post-intervention, and (f) data analysis. Each phase is described to include purpose, actions, and time frame (Table 3.4).

Table 3.4 *Timeline of Procedures for Performance Control Action Research*

Phase	Action	Time Frame
Phase 1: Preliminary requirements	• Gain permission from teachers to use their classes for research (Appendix F) • Gain permission for the school district to conduct research (Appendix F) • Distribute and collect consent and assent forms from students and parents (Appendix D and E)	• Up to week 1
Phase 2: Baseline data and information	• Administer survey (Appendix A) • Provide direct instruction overview of training for SRL strategy use • Provide access to and review of digital learning log (Appendix C)	• Week 2
Phase 3: SRL cycle using digital support resources	• The student is directed to use digital learning log to document daily goals, personal reflection on daily SRL, and to generate a plan for the next day (Appendix C) • Researcher accesses digital learning logs and provides individual feedback weekly • Repeat process every week for six weeks	• Week 2 – 8
Phase 4: Data collection concurrent to student development	• Daily collection of learning log entries (Appendix C) • Collection of researcher feedback within the learning log	• Week 2 – 8
Phase 5: Data collection post intervention	• Administer survey (Appendix A) • Student focus group interviews (Appendix B)	• Week 8 - 11
Phase 6: Data analysis	• Administer survey (Appendix A) • Student focus group interviews (Appendix B)	• Week 11-16

Phase 1: Preliminary phase

Initially, teacher consent from the AVID course teacher to access the class was obtained. School and district level permission was requested and granted for the course where consent was obtained (Appendix F). Institution Review Board clearance was sought, and obtained. Students in this study were not deemed subject to the Protection of Human Subject Regulations, and no further oversight from the review board was needed (See Appendix H). Once teacher, school, and district consent were in place, student assent and parent consent forms were distributed and collected (Appendix D and E). Students were reminded that consent is voluntary and can be removed at any time without academic or other penalties.

Phase 2: Baseline Data and Information

Once all proper consent and assent were obtained, the MSLQ subscales were proctored to students via a Google Form during the AVID class period (Appendix A). After the survey, students were presented information about SRL, strategies to facilitate SRL, and its benefits from the researcher via Google Slides (Appendix G). Information presented included benefits such as optimal learning and post-secondary academic success, as well as the phases of SRL described in chapter two literature review (Nilson, 2013). These slides remained available to students within Google Classroom for the duration of the intervention. An overview of the learning log instrument (Appendix C) was provided during the lesson to support student use of the tool.

Phase 3: SRL Cycle using Digital Documentation and Support

Students used digital learning logs to document daily goals, reflections, and next steps. Learning logs were used in AVID classes prior to this intervention. However, they

did not require self-ratings about SRL strategy use. A review of the process, including sections and procedures, was provided. Sections included learning targets, learning plans, self-assessment, and reflection. Procedures included inserting the learning target provided by the teacher and generating a learning plan based on the day's agenda before the lesson, then document daily actions with self-assessment and making a reflection after the lesson. These procedures were prompted by the classroom teacher. Digital learning logs were shared with me as the researcher and received individualized messages to prompt the development of SRL skills. Feedback was provided by me to support the innovation for each student every three days.

Phase 4: Data Collection Concurrent to Student Development

Assignments in Google Classroom ran on a three-day cycle. Every three days, students were instructed to write a reflection about strategy use, effectiveness, and opportunities for improvement. The researcher accessed these as log entries and provided individual feedback. This process was repeated every three days for six weeks. Students had access to all of their responses and feedback through the duration of the intervention.

Phase 5: Data Collection Post Intervention

After completing an introduction to SRL and a subsequent six weeks of follow up through personal tracking and feedback, students completed the MSLQ subscales instrument to provide quantitative data (Appendix A). Student focus group interviews were conducted to provide descriptive, qualitative data about students' task-related device use during instructional sessions with a one-to-one student to computer ratio using interview protocol instruments (Appendix B).

Phase 6: Data Analysis

Analysis of both quantitative and qualitative data gathered from varied data sources occurred to answer my research questions. Log entries and interview coding began as data became available, with initial coding aligning to themes from previously used quantitative scales. Once all data is collected, inductive coding started with a review of coding for additional themes or outliers. Data from the MSLQ pre-test and post-test, as well as log entry self-ratings, were analyzed separately to provide descriptive statistics on four MSLQ subscales, and each of the four log entries self-rating subscales. Finally, dependent *t*-tests were conducted to provide inferential statistics for all subscales.

Rigor and Trustworthiness

For qualitative data sources, several methods were used to ensure rigor and trustworthiness, including (a) triangulation, (b) member checking, (c) peer debriefing, and (d) an audit trail.

Triangulation

Methodological triangulation is the use of multiple or mixed methods to corroborate findings by combining data (Creswell, 2013; Mertler, 2017). This was done by combining a quantitative source (MSLQ) with multiple qualitative sources, including learning log entries and interviews. These combined data sources can provide additional useful information to the researcher that could not be gotten from a single method (Shenton, 2004). Additionally, similar results across multiple data sources strengthen the trustworthiness of findings (Patton, 2002). In this study, survey results and log entry self-rating results provided descriptive statistics, such as reporting the mean and standard deviation of the responses. However, quantitative results could not explain why the

participant selected that response. Interviews provided additional data needed to learn more. Learning log reflections provided the time-series data for aligning participants' self-reports on the survey and interviews with their reflection during the intervention process. Triangulation between data sources further corroborates findings.

Member Checking

Member checking is verifying the accuracy of data and findings continuously with participants (Mertler, 2017). This is important for my research trustworthiness because it helps to reduce researcher interpretation when reporting data by ensuring data reflect the position of participants (Creswell, 2013). Member checking occurred by sharing documents and analysis artifacts with participants after their submission of logs and transcription of interviews. Using member checking also supported my plan to share findings with stakeholders, which includes student and teacher participants.

Peer Debriefing

Peer debriefing is a discussion between the researcher and a superior or steering group (Shenton, 2004). Peer debriefing occurred with my dissertation chair to help verify findings. This happened after I had analyzed findings by working with my dissertation chair, who served as an external auditor to the study. In this audit, findings and analysis were examined to establish flaws and determine opportunities for further analysis. This external review increased rigor and trustworthiness for my study by ensuring details were analyzed from multiple perspectives with experience and expertise in research and the educational technology field (Creswell, 2013). Additionally, peers in the doctoral program have reviewed my work continuously throughout the development process and provided feedback and an outside perspective.

Audit Trail

An audit trail is the documented monitoring of a researcher's developing findings (Mertler, 2017). I used an audit trail to provide evidence of how I reached my decisions and progressed through my research. By creating memos in a Google document, I described thoughts such as evidence for patterns I saw emerge and questions I wanted to further explore in future interviews. Delve category description memos were written and edited to describe the category as codes were group, providing insight into the reasoning and selection for categorization. Additionally, notes were made on printouts of transcripts, articles, and outlines to support continuous thinking, follow-up, and documentation. These notes were important for my research because they allowed me to elaborate on my thinking processes and further develop connections to and within the study.

Plan for Sharing and Communicating Findings

Presentation of findings to student participants occurred during a personal enrichment period known as Half-Time. Collecting participants' thoughts and recommendations concerning the study took place during a subsequent discussion group. I reminded participants to alert me, as the researcher, or the classroom instructor if they wished for their data to be removed from the study or have other concerns before presenting findings outside of the school setting. Locally, presenting findings to district-wide faculty, administrators, and community members attending the [School District] Technology Conference will take place after concluding the study. Following this study, opportunities to submit proposals for sharing findings at relevant regional conferences will arise, such as the South Carolina Educational Technology Conference and Upstate

Technology Conference. Nationally, I will tie in my role as an instructional school leader and submit a proposal to the Association for Supervision and Curriculum Development Conference. Additionally, since the study involves AVID students and strategies for SRL, a proposal to present findings at the AVID National Conference will be submitted. When sharing and presenting findings, participant confidentiality was, and will always be, protected by using participant identification numbers for quotations when included, as well as for any other quantitative data in a manner that is general enough for a specific student not to be identifiable.

CHAPTER 4

FINDINGS AND INTERPRETATIONS

The purpose of this action research was to evaluate the impact of digital learning logs to support SRL for high school students of average achievement who have individual access to digital connectivity within the classroom. The findings of this study provide insight regarding the use of learning logs with individualized feedback as the primary support for the development of SRL skills in a one-to-one Chromebook instructional setting with networked resources. This chapter presents findings obtained from both quantitative measures (i.e., adapted SRL subscales of the MSLQ) and qualitative measures (i.e., student learning logs and student interviews). The following research questions guided data collection: (a) how and to what degree does SRL strategy support affect high school students' SRL, (b) how and to what degree SRL strategy support affect high school students' performance control, and (c) how do students describe the impact of SRL strategy support on their task-related device use.

Part one of this chapter shares quantitative findings from pre- and post-test results. Part two describes the common themes that emerged from the qualitative data.

Quantitative Findings

MSLQ Pretest-Posttest

An adapted version of the MSLQ developed by Pintrich et al. (1991) measured students' perceptions of their SRL skills on a 7-point Likert scale ranging from 1 (*Not at all true of me*) to 7 (*Very true of me*). This questionnaire consisted of three subscales:

metacognitive SRL subscale (12 items), effort regulation subscale (3 items), and time and environment management subscale (7 items). Due to adapting this survey for this study, the reliability coefficients (Cronbach's alpha) were calculated again for both pre and post implementations of the scale. For the pretest, the reliability score for the whole instrument was .86, and .76 for metacognitive SRL, .76 for effort regulation, and .66 for time and environment management subscales. For the posttest, the reliability score for the whole instrument was .91, and .81 for metacognitive SRL, .76 for effort regulation, and .81 for time and environment management subscales.

Descriptive statistics. Averaging occurred for each participant's composite SRL score. Students' average SRL scores increased from pretest (M = 3.90, SD = 1.00) to posttest (M = 5.95, SD = 0.54). The highest increase from pretest to posttest was observed in the metacognitive SRL subscale, whereas the lowest increase was in effort regulation. Table 4.1 presents the descriptive statistics for each subscale of MSLQ for both pre- and posttests.

Table 4.1 *Descriptive Statistics: MSLQ subscales*

	Pretest		**Pretest**	
Subscales	Mean (SD)	Median	Mean (SD)	Median
Metacognitive SRL	3.51 (0.99)	3.50	5.71 (0.56)	5.75
Effort regulation	4.62 (1.82)	4.66	6.31 (0.66)	6.33
Time and environment management	4.24 (1.19)	4.28	6.22 (0.55)	6.14
Average Score	3.90 (1.00)	3.98	5.95 (0.54)	6.04

Inferential statistics. Because four separate tests were needed for the same set of data, the desired alpha significance level, $\alpha = .05$, was adjusted using the Bonferroni correction. *P*-values less than .0125 were considered significant. Conducting separate

paired-samples t-tests evaluated the effect of SRL strategy support on students' perceptions of their metacognitive SRL, effort regulation, time and environment management skills, and overall self-rating. Table 4.2 represents the inferential statisitcs findings for comparison of MSLQ pre- and posttest data.

Table 4.2 *Inferential Statistics: MSLQ subscales*

	Pretest	**Posttest**	
Subscales	Mean (SD)	Mean (SD)	***t*-test**
Metacognitive SRL	3.51 (0.99)	5.71 (0.56)	t(13) = -7.52, p < .001
Effort regulation	4.62 (1.82)	6.31 (0.66)	t(13) = -3.27, p < .0125
Time and environment management	4.24 (1.19)	6.22 (0.55)	t(13) = -5.25, p < .001
Average Score	3.90 (1.00)	5.95 (0.54)	t(13) = -6.75, p < .001

A paired-samples *t*-test was conducted to evaluate whether students' perceptions of their overall SRL skills changed from pretest to posttest. The results indicated that the mean posttest score (M = 5.95, SD = 0.54) was significantly higher than the mean pretest score (M = 3.90, SD = 1.00), $t(13) = -6.75$, $p < .001$. The standardized effect size index, d, was 1.80, indicating a large effect of the SRL strategy support intervention on students' overall SRL skills. The 95% confidence interval for the mean difference between the pretest and posttest means was -2.72 to -1.40.

To evaluate the change in students' perceptions of their metacognitive regulation skills changed from pretest to posttest, a paired-samples t-test was used. Results from the *t*-test indicated that the mean posttest score (M = 5.71, SD = 0.56) was significantly higher than the mean pretest score (M = 3.51, SD = 0.99), $t(13) = -7.52$, $p < .001$. The standardized effect size index, d, was 2.00, indicating a large effect of the SRL strategy support intervention on students' perceptions of their metacognitive SRL skills. The 95%

confidence interval for the mean difference between the pretest and posttest means was -2.83 to -1.56.

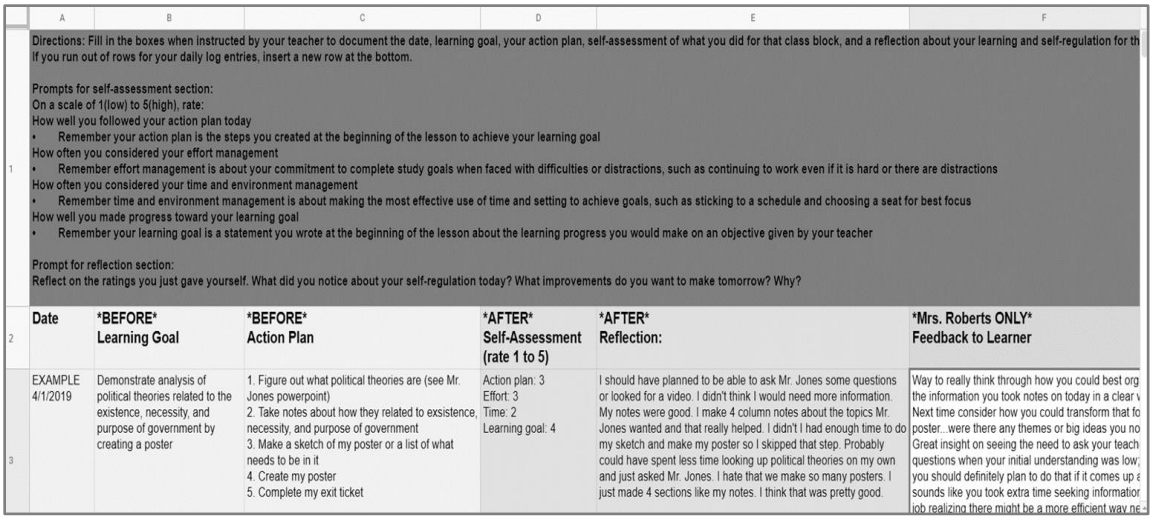
A paired-samples t-test was conducted to evaluate whether students' perceptions of their effort regulation skills changed from pretest to posttest. Results from the *t*-test indicated that the mean posttest score (M = 6.31, SD = 0.66) was significantly higher than the mean pretest score (M = 4.62, SD = 1.82), $t(13) = -3.27$, $p < .0125$. The standardized effect size index, d, was .87, indicating a large effect of the SRL strategy support intervention on students' perceptions of their effort regulation skills. The 95% confidence interval for the mean difference between the pretest and posttest means was -2.81 to -.57.

Lastly, to evaluate whether students' perceptions of their time and environment management skills changed from pretest to posttest, a paired-samples *t*-test was conducted. Results from the t-test indicated that the mean posttest score (M = 6.22, SD = 0.55) was significantly higher than the mean pretest score (M = 4.24, SD = 1.19), $t(13) = -5.25$, $p < .001$. The standardized effect size index, d, was 1.40, indicating a large effect of the SRL strategy support intervention on students' perceptions of their time and environment management skills. The 95% confidence interval for the mean difference between the pretest and posttest means was -2.79 to -1.16.

Learning Log Self-Report of SRL Skills Application

Using digital learning logs promoted and documented the components of the SRL cycle (i.e., forethought and reflection). Students generated personal action plans at the start of each lesson. At the end of the lesson, students were directed back to learning logs to reflect on the goal set at the beginning of the lesson and to self-assess quantitatively

with a self-rating and qualitatively with a reflection about personal use of SRL skills (see Appendix C). Quantitative self-rating responses evaluated personal use of adherence to the action plan, effort, time management, and goal achievement. Students self-rated using a 5-point Likert scale ranging from 1 (*low*) to 5 (*high*). The prompt was located in a frozen row for reference when completing log entries (see Figure 4.1).



	A	B	C	D	E	F
1	Directions: Fill in the boxes when instructed by your teacher to document the date, learning goal, your action plan, self-assessment of what you did for that class block, and a reflection about your learning and self-regulation for th If you run out of rows for your daily log entries, insert a new row at the bottom. Prompts for self-assessment section: On a scale of 1(low) to 5(high), rate: How well you followed your action plan today • Remember your action plan is the steps you created at the beginning of the lesson to achieve your learning goal How often you considered your effort management • Remember effort management is about your commitment to complete study goals when faced with difficulties or distractions, such as continuing to work even if it is hard or there are distractions How often you considered your time and environment management • Remember time and environment management is about making the most effective use of time and setting to achieve goals, such as sticking to a schedule and choosing a seat for best focus How well you made progress toward your learning goal • Remember your learning goal is a statement you wrote at the beginning of the lesson about the learning progress you would make on an objective given by your teacher Prompt for reflection section: Reflect on the ratings you just gave yourself. What did you notice about your self-regulation today? What improvements do you want to make tomorrow? Why?					
2	**Date**	***BEFORE* Learning Goal**	***BEFORE* Action Plan**	***AFTER* Self-Assessment (rate 1 to 5)**	***AFTER* Reflection:**	***Mrs. Roberts ONLY* Feedback to Learner**
3	EXAMPLE 4/1/2019	Demonstrate analysis of political theories related to the existence, necessity, and purpose of government by creating a poster	1. Figure out what political theories are (see Mr. Jones powerpoint) 2. Take notes about how they related to exsistence, necessity, and purpose of government 3. Make a sketch of my poster or a list of what needs to be in it 4. Create my poster 5. Complete my exit ticket	Action plan: 3 Effort: 3 Time: 2 Learning goal: 4	I should have planned to be able to ask Mr. Jones some questions or looked for a video. I didn't think I would need more information. My notes were good. I make 4 column notes about the topics Mr. Jones wanted and that really helped. I didn't I had enough time to do my sketch and make my poster so I skipped that step. Probably could have spent less time looking up political theories on my own and just asked Mr. Jones. I hate that we make so many posters. I just made 4 sections like my notes. I think that was pretty good.	Way to really think through how you could best org the information you took notes on today in a clear v Next time consider how you could transform that fo poster...were there any themes or big ideas you no Great insight on seeing the need to ask your teach questions when your initial understanding was low; you should definitely plan to do that if it comes up a sounds like you took extra time seeking information job realizing there might be a more efficient way ne

Figure 4.1. Example of learning log self-rating prompt.

Participants (n = 14) self-rated every three classes for thirty days, resulting in 10 entries total per participant. Absences were excluded from self-rating on those days. Ratings were analyzed for change over time, as well as paired for inferential statistics to determine if there was a significant change over time, specifically from entry to entry ten. Entry two was selected as a baseline for self-reporting SRL strategy use in economics class due to entry one occurring during the introductory overview lesson about SRL strategies, accessing and use of learning logs, and information about this study.

Descriptive statistics. Descriptive statistics was used to calculate student self-ratings of SRL skills, including subscales for action planning, effort regulation, time management, and goal achievement (See Table 4.3). Week two self-rating means range

from 1.92 to 2.92. Week ten self-rating means range from 4.33 to 4.92. The highest week two subscale mean was 2.92 in both time management and learning progress goals. The highest week ten subscale mean was 4.92 in learning goal progress. The mean for each subscale and overall total mean increased. Action planning (M = 4.75; SD = 0.45) and learning goal progress (M = 4.92; SD = 0.29) had the most favorable responses. Action planning and learning goal progress means from week two self-ratings to week ten self-ratings decreased the least with variance and became the highest-rated subscales.

Table 4.3 *Descriptive Statistics: Learning Log Entry Self-Rating Means Comparison*

	Log Entry 2		**Log Entry 10**	
Question Subscales	Mean (SD)	Median	Mean (SD)	Median
Action planning	1.92 (0.52)	2.0	4.75 (0.45)	4.0
Effort regulation	2.83 (0.39)	3.0	4.33 (0.49)	4.0
Time management	2.92 (0.52)	3.0	4.5 (0.52)	4.0
Learning goal progress	2.92 (0.78)	3.0	4.92 (0.29)	5.0

To examine the change in students' self-ratings for action planning, effort regulation, time management, and learning goal progress over time, average scores for each entry were calculated. Figure 4.2 represents the mean for each subscale over the ten entries made during this study. Overall, action planning had the greatest report of growth increasing 2.83 points when comparing means from week two (M = 1.92, SD = 0.52) to week four (M = 4.75, SD = 0.45). The least change was indicated in effort regulation shifting an average of 1.5 points when comparing means from week two (M = 2.83, SD = 0.39) to week four (M = 4.33, SD = 0.49).

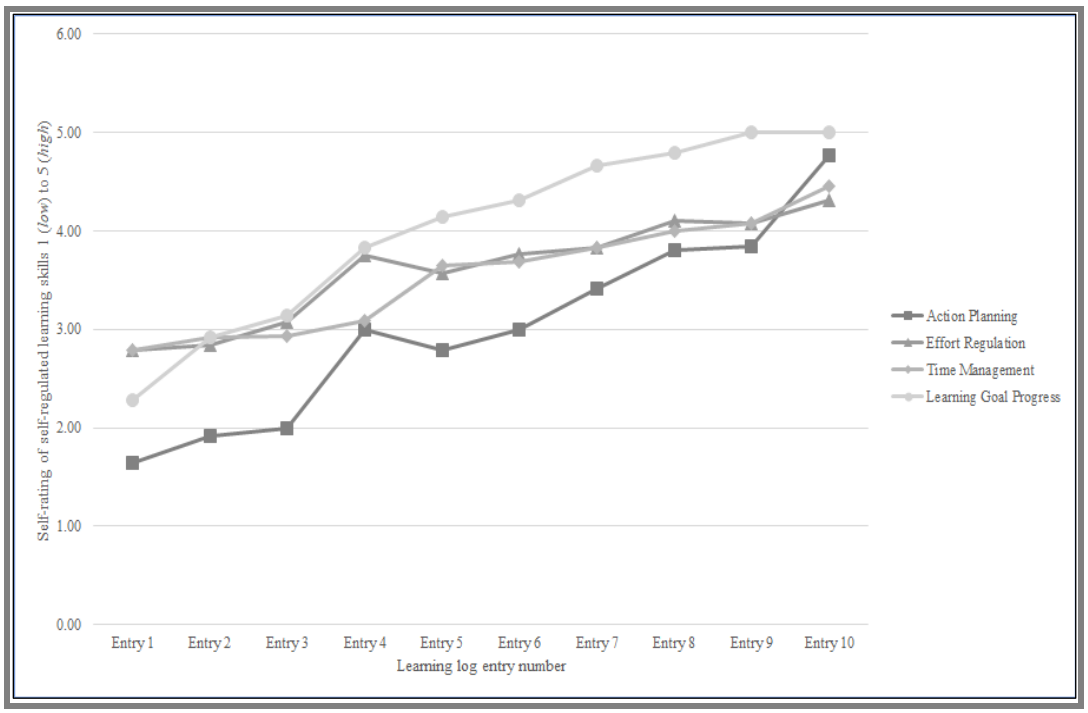


Figure 4.2. Change in self-rating of SRL skills over time.

Inferential statistics. Participants (n = 14) completed self-ratings of SRL skills throughout the innovation. Comparing log entry two self-ratings and log entry ten self-ratings examined the change over time in students' self-ratings for each subscale. Selecting entry two as the beginning point occurred due to entry one happening during a lesson that served as an introduction to the research with limited focus on economics content.

Separate nonparametric tests evaluated the effect of SRL strategy support on students' perceptions of their action plan usage, effort regulation, time management skills, and learning goal progress. Two students without responses due to absences were removed from the data set. This correction method was selected over imputation due to the potential impact of inputting the median on the small sample size. When preparing to conduct dependent *t*-tests on this data set, a Shapiro-Wilk test for normality assumptions

for the subscales were not met. Due to a limited number of usable participants (n = 12) available for pairing and a lack of normality, a Wilcoxon Signed-Rank Test was used to compare median entry two to entry ten in all four subscales. Because four separate tests were needed for the same set of data, the desired alpha significance level, $\alpha = .05$, was adjusted using the Bonferroni correction. *P*-values less than .0125 were considered significant. Results of the analysis are shown in Table 4.4.

Table 4.4 *Inferential Statistics: Learning Log Entry Self-Rating Means Comparison*

Question Subscales	**Median Entry 2**	**Median Entry 10**	**Wilcoxon Signed-Rank Test**
Action planning	2.0	4.0	Z = 3.211, p < .01
Effort regulation	3.0	4.0	Z = 3.145, p < .01
Time management	3.0	4.0	Z = 3.126, p < .01
Learning goal progress	3.0	5.0	Z = 3.357, p < .01

The first Wilcoxon Signed-Rank Test evaluated whether students' perceptions of their action plan usage changed from log entry two to log entry ten. The output indicated entry ten scores were higher (*Mdn* = 4.0) than entry two scores (*Mdn* = 2.0), this difference was statistically significant, $Z = 3.211$, $p < .01$, at the corrected alpha level ($\alpha = .0125$).

The second Wilcoxon Signed-Rank Test evaluated whether students' perceptions of their effort regulation changed from log entry two to log entry ten. The output indicated entry ten scores were higher (*Mdn* = 4.0) than entry two scores (*Mdn* = 3.0), this difference was statistically significant, $Z = 3.145$, $p < .01$, at the corrected alpha level ($\alpha = .0125$).

The third Wilcoxon Signed-Rank Test evaluated whether students' perceptions of their time management changed from log entry two to log entry ten. The output indicated entry ten scores were higher (*Mdn* = 4.0) than entry two scores (*Mdn* = 3.0), this difference was statistically significant, $Z = 3.126$, $p < .01$, at the corrected alpha level ($\alpha = .0125$).

The fourth Wilcoxon Signed-Rank Test evaluated whether students' perceptions of their learning goal progress changed from log entry two to log entry ten. The output indicated entry ten scores were higher (*Mdn* = 5.0) than entry two scores (*Mdn* = 3.0), this difference was statistically significant, $Z = 3.357$, $p < .01$, at the corrected alpha level ($\alpha = .0125$).

Qualitative Findings and Interpretations

Student interviews and reflections produced qualitative data for this study to provide descriptive information related to the impact of personally using digital learning logs. Three focus groups composed of three student participants each responded to interview questions. Daily learning log reflections were pulled from the participants to add one weekly reflection per student to the qualitative data pool, totaling 84 analyzed reflections. Open-ended questions during the interview asked for specific feedback regarding the impact of log use in the studied economics class, as well as transfer to other courses. Transcribing interview verbatim ensured accuracy. Sharing a Google Doc of the transcription for each focus group interview permitted pertaining student participants an opportunity member checking. Asking students to use the comment feature in Google Docs provided notes on any areas that needed clarification or correction. The participants did not leave any comments. Daily reflections provided a general prompt inquiring about

the student's SRL strategy use and plans for the next day. Reflection responses were copied directed out of the logs and pasted into Delve coding software within a transcription for each of the six weeks studied. Delve was used to house all coding of transcripts and organization of sub-categories, categories, and themes. The following sections will provide an overview of qualitative data sources, the process used for qualitative data analysis, and a description of each emergent theme.

Qualitative Data Sources

The following section will provide an overview of the data sources used to collect qualitative data: a) interviews and b) weekly reflections. The tool and amount of data collected for each source are described.

Interviews. Participants were selected to participate in focus group interviews consisting of three participants each. Student availability during the school day determined interview selection. Student assent was requested to ensure the interview was not encumbering their time or burdening their coursework. Interview spots were filled based on student availability, skipping students unable to participate at that time, and calling the next student to join the group until filling the group. Each group was recorded and asked open-ended questions in order (see Appendix B). Providing wait time ensured all participants were able to answer each question. Recordings were transcribed in a Google Doc later shared with the participants for member checking. Delve coding software housed the uploaded Google Docs.

Reflections. Participants were prompted by their teacher every three days to complete a reflection about learning log use. Figure 4.3 provides a sample of a student's learning log. Columns one, two, and three were completed at the start of the lesson.

Columns four and five were completed after the lesson. The last column was used to provide the student feedback on SRL strategy use. Reflections were written in the fifth column titled “reflection” within each student’s learning log. All logs, including the reflections, were created and shared in Google Sheets. One reflection per week was selected from each of the interview participant’s log to provide a week by week sample of student thought about log use, SRL, and planning. Reflections were labeled by participants and copied verbatim from the logs into six weekly transcripts in Delve.

4/30/2019	Voluntary exchange	My goal for today is to my Study guide so i can make a good grade on it for this Class.	Action plan:3 Effort:3 Time:3 Learning goal:3	When i got done with my work i stopped playing games and i shut it off and did the rest of my work	Write down your goals for each study period. Look out all the things you can think of you will need to c goal. Consider determining how much time you will each part. You can also check them of as you go!
5/6/2019	Market exhange	My goal for today is to finish the annocation questions that I have not finished, start choice board	Action plan:3 Effort:4 Time:3 Learning goal:3	i became distracted easily and the reminders in my log help me stay on track	
5/9/2019	Market regulation	One assignment that I will work on today is to finish my economics decsion marking, write down some of the notes that are in the classroom	Action plan:3 Effort:4 Time:4 Learning goal:4	Looking and rasearching the articles and authors seemed easy but when I did it it was much harder. When I went to research the authors I really could not find much information because they were not that well known. What made me realize that it was realible was that it ened in .org and becuase it was an educational website. What I did not included in my goal is that it had to relate to the topic.	
5/14/2019	Effects on consumers and producers	Starting on my story for evaluation process and starting on the webquest	Action plan:3 Effort:4 Time:4 Learning goal:5	Having multiple things to do on it at once and being overwhelmed and having to take a step back before diving back in	Skim the reading material before you begin to see organized. Look at the headings and subheadings yourself an idea of how things are related to each other.
5/17/2019	Competition	ABSENT	ABSENT	ABSENT	ABSENT
5/22/2019	Competition and prices	Today I'm going on google classroom to work on the Edpuzzle and benefits vs cost, Vocab chart	Action plan:4 Effort:4 Time:4 Learning goal:5	when working on production cycles at first i had not a clue what to do so i went back and watched a video of a guy working the problems and when he worked the problems out and demonstrated I finally completed my problems	

Figure 4.3. Sample of a student’s learning log.

Analysis of Qualitative Data

Qualitative data provided from learning log reflections and interviews were analyzed through inductive analysis to support findings for research questions two and three. Coding occurred by transcribing reflections and interviews. First-round coding emerged from participant data through the use of primarily process coding (i.e., planning, using, and monitoring). Favoring process coding oriented the codes around the actions of

the participants (Charmaz, 2006; Saldana, 2016). Due to the nature of this research focusing on performance control and learning log impact, action-based process coding was used whenever possible. Descriptive coding and in vivo coding use described the participant's intent of the statement or directly represented it in the participant's own words, respectively (Creswell, 2013; Saldana, 2016). Limited attribute codes (i.e., week 1, week 2) documented the time in the research series where each reflection originated (Saldana, 2016).

Sentence by sentence coding was the unit of measure for all codes except attribute. Attribute codes were applied holistically to the transcript of the week attributed. The functionality of the Delve coding program supported the use of these units of measure. Developing codes in first-round coding resulted in a total of 60 initial unique descriptive and processing codes. Unique attribute codes totaled six, one for each week of innovation implementation studied. Initial coding samples are shown in Figure 4.4.

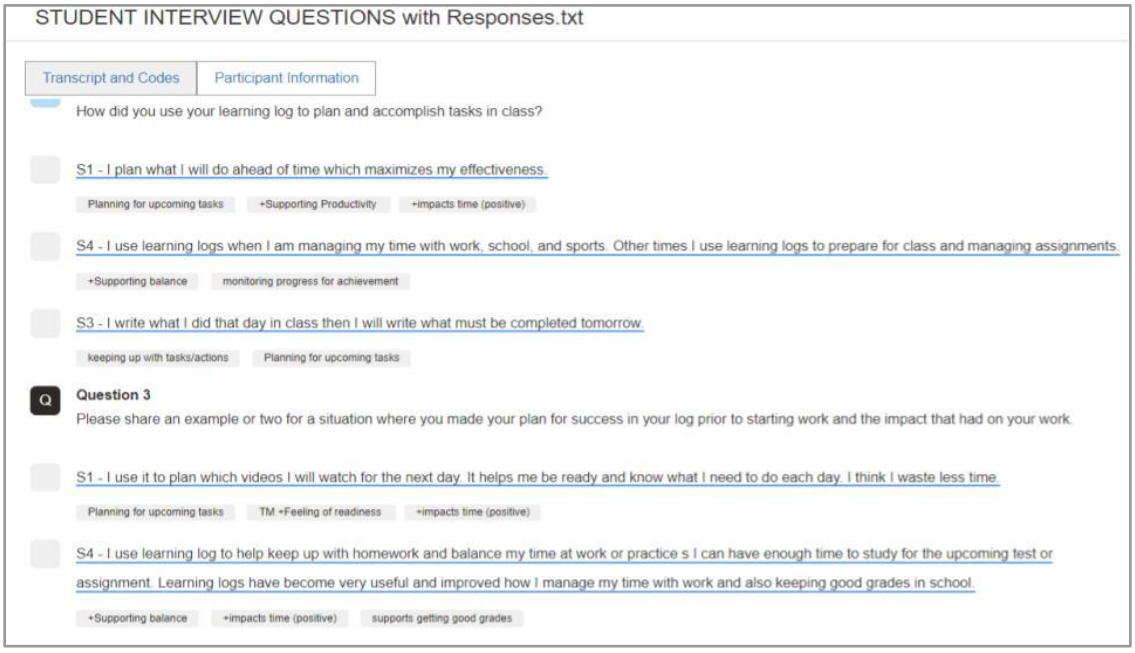


Figure 4.4. Example of initial coding in Delve coding program.

Among the 60 initial codes, 39 originated from interview transcripts. Learning log reviews produced 21 additional unique codes. Table 4.5 presents the types of qualitative data sources, the number of student responses, and the total number of codes applied.

Table 4.5 *Quantity of Qualitative Data by Source*

Qualitative Data Source	**Number**	**Created Codes**
Interview transcripts	9 participants	39
Learning log reflections	14 participants (84 reflections)	21

For the second round of coding, eclectic coding combined the multiple coding styles into synthesized groups (Saldana, 2016). Initial codes were printed from Delve, annotated with initial thoughts about what the category could be, and cut into strips for grouping. Printed slips allowed for flexibility in sorting and category creation. Figure 4.5 shows the strips and groupings. Using plastic bags attached to file folders made the system portable, allowing for multiple sessions of sorting and placement. Initial category creation was an open process determined by my assessment of key features of the code. Using predetermined categories prompted thought toward SRL, but potential categories will not be limited to that list. Examples of predetermined categories include monitoring, planning, strategy use, and evaluation.

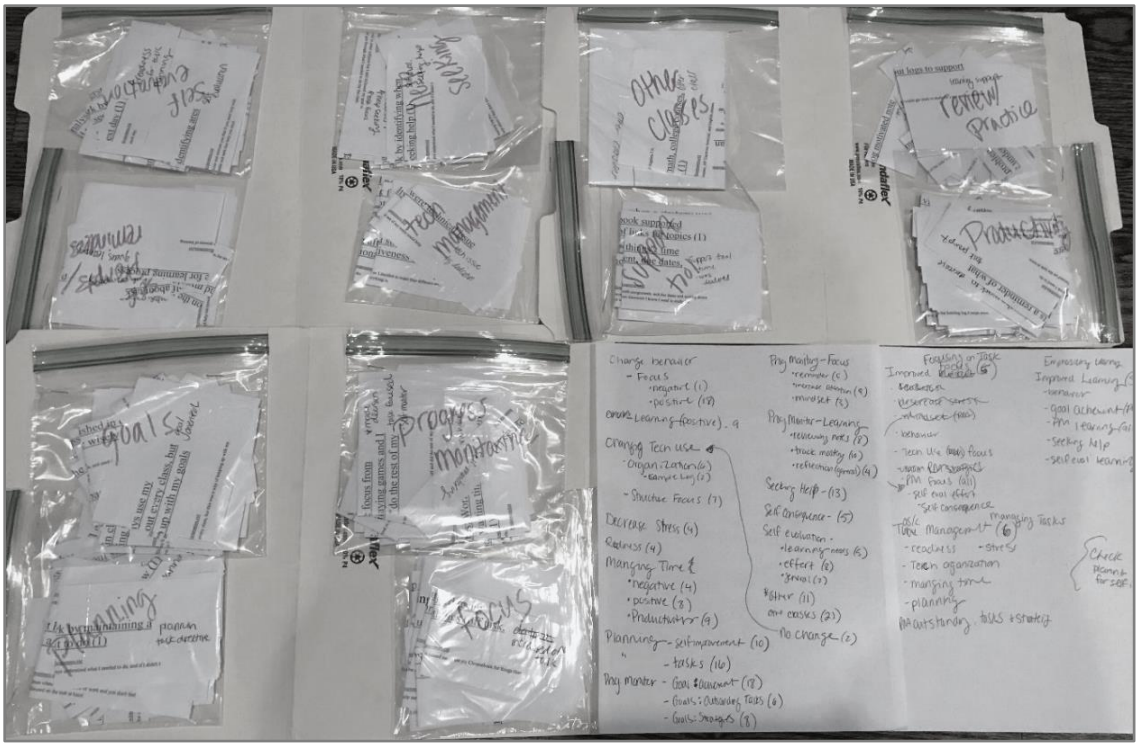


Figure 4.5. Example of code sorting system.

Making tags in the Delve system occurred by revisiting each slip. Slip review provided an excellent opportunity to determine if the codes were a just-right fit for the category, or if they belonged somewhere else. Plus signs (+) were used to note the grouping of codes with positive implications. Minus signs (-) were used to note the grouping of codes with negative implications. An equal sign (=) was used when the participant indicated no change. Comments that were general or did not discuss impact did not receive a symbol. Analytic memos were written in Delve to describe the thought process for combing codes (Figure 4.6). Some codes required the application of more than one category to reflect multiple meanings (Mertler, 2017). In such cases, the code was duplicated by tagging it with more than one category. After second-round analysis, a total of 29 categories and subcategories emerged.

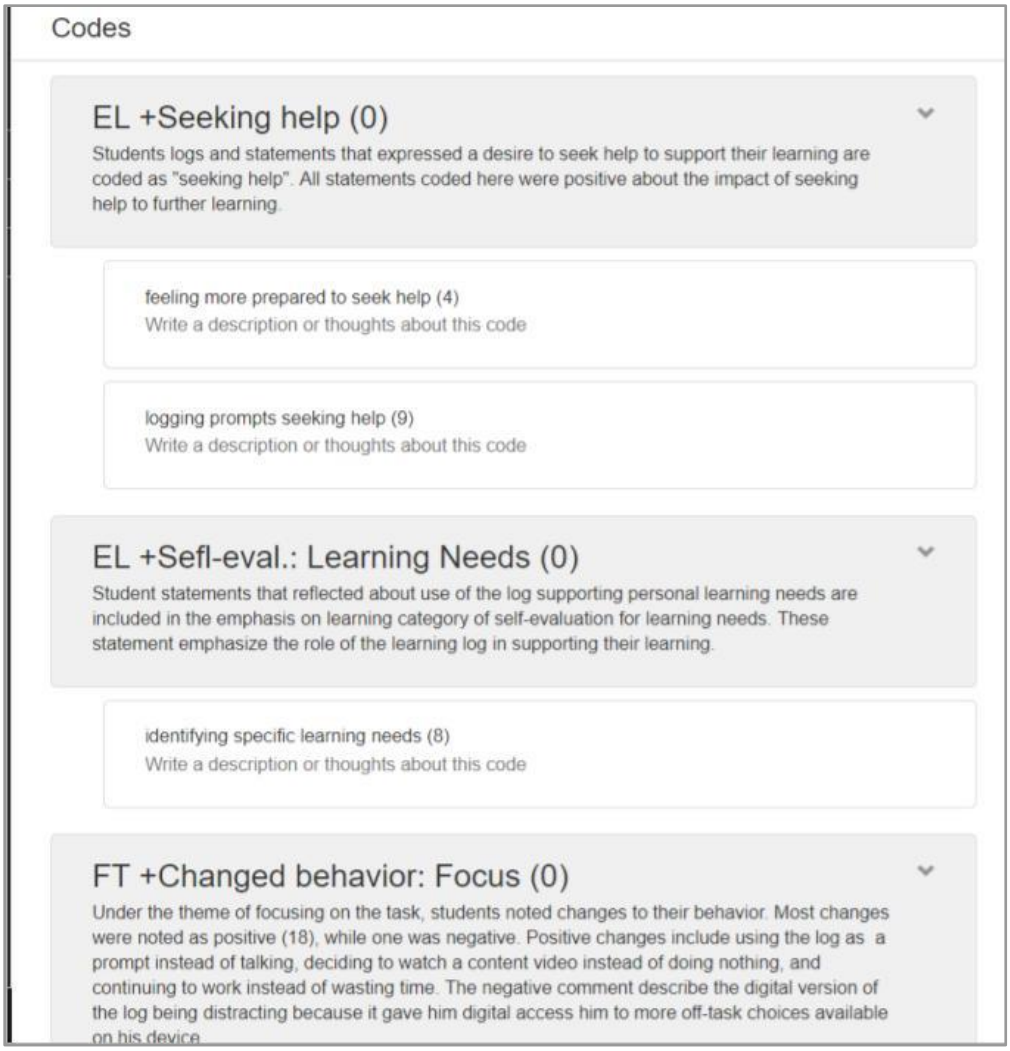


Figure 4.6. Example of analytical memos created in Delve coding program.

Categories were analyzed for commonality to find the most descriptive wording to reflect interrelationship among initial codes (Creswell, 2013). When evaluating data for the second round of coding, the "codes" screen in Delve was used to review groupings. Category and code grouping were reviewed and would be shifted to alternate groups to ensure the best fit for the purpose and memo of the group. Writing analytical memos uncovered that some groups, such as productivity, were subgroups under larger categories, such as time management. Grouping, reviewing, and refining initial codes into categories and subcategories encumbered a great amount of time. When applicable, a

winnowing of data promoted refinement if it was determined data lacked purpose or a relationship to the research (Creswell, 2013). Removed codes were saved to a secondary group so they could be reviewed after each round of coding to determine if any applicable category had arisen. In all, 15 major categories emerged, as seen in Figure 4.7.

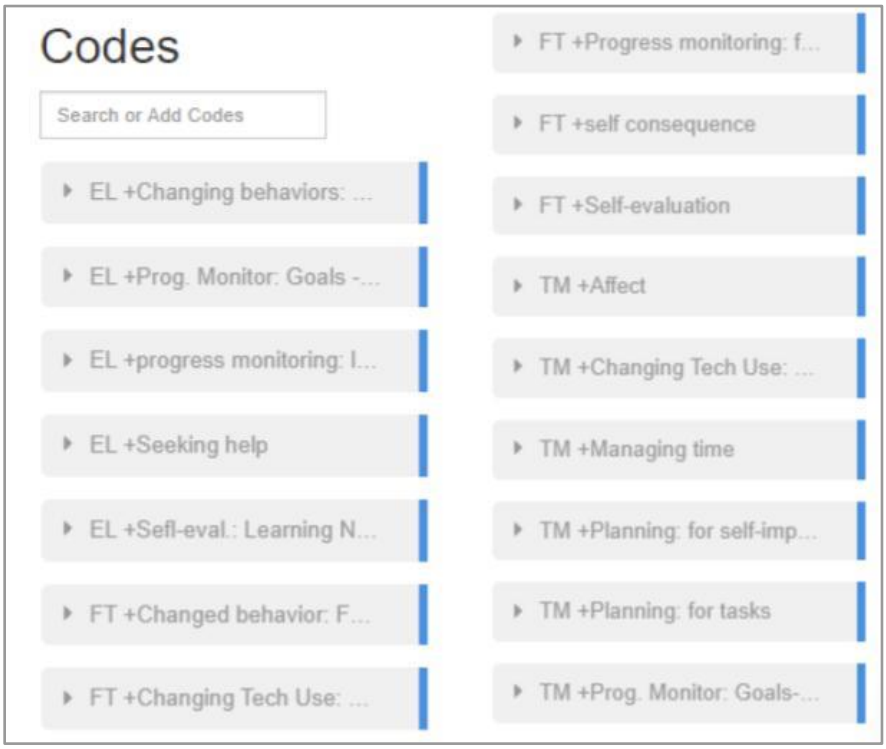


Figure 4.7. Example of codes tabs used during category refinement.

Finally, pattern coding looked for overarching connection points among the eclectic codes to establish data groupings at the broadest level. My discretion as the researcher was used to determine the grouping of categories and the development of themes. Similar to category development, using analytical memos in Delve provided a great space for drafting and editing definitions for each potential theme as they emerged. Using the "codes" screen and a second window displaying the "transcript" screen allowed me to label, manipulate, and review theme creation. By laying the codes screen and transcript screen side by side, categories could be reviewed and then manipulated with

title edits. Initial labels of "T" for a task and "L" for learning were used to group the intent of the category. After reviewing the categories, it was evident that categories described two main themes in the group of "tasks," an emphasis on personal focus and an emphasis on detail management. Revising categories resulted in the labels of "EL" for "emphasis on learning," "FT" for "focus on task," and "TM" for "task management." Refreshing the Delve "Codes" screen moved all the codes together into a running list alphabetically. Grouping codes allowed for all categories and related codes that could be a potential theme to be grouped (see Figure 4.8).

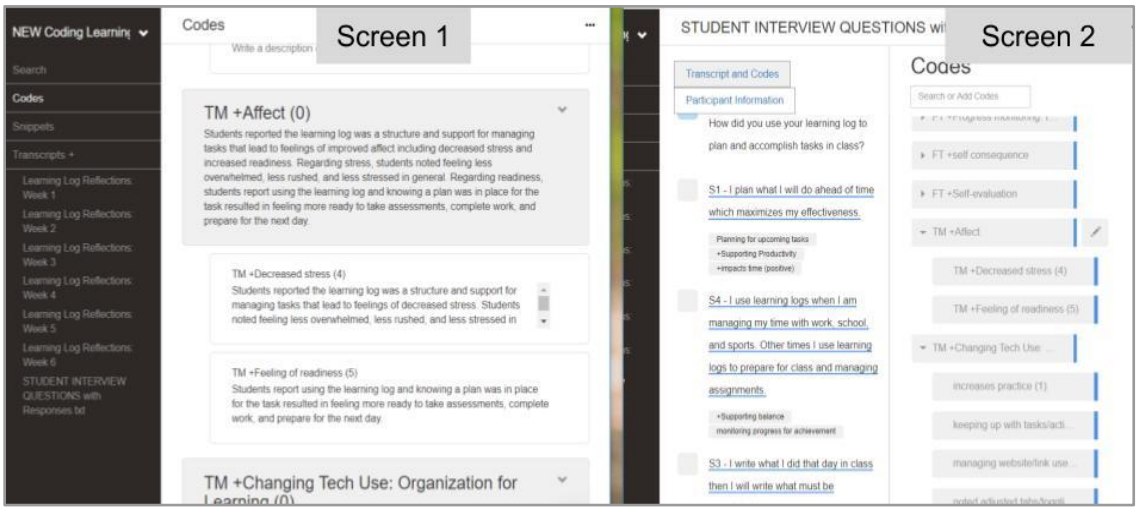


Figure 4.8. Example of using a lettering system to group categories in Delve.

Describing the characteristics of these themes supported my ability to describe, relate, and compare categories and participant statements within each theme (Bazeley, 2013; Mertler, 2017). Themes have been written as narrative descriptions using rich details, including category and sub-category descriptions, as well as several quotes from participants taken from both reflections and interviews. Themes and descriptions from this inductive analysis supported findings for research questions. Regular peer debriefing

occurred to check for appropriate coding and analytical development of categories and themes.

Presentation of the Findings

The following section will present the findings from an analysis of the qualitative data collected from participant interviews and weekly learning log reflections. Three themes emerged as a result of category analysis. Students expressed the use of digital learning logs to support SRL impacted them through three primary themes: (a) digital learning logs supported student learning by managing tasks, (b) digital learning logs supported student learning by focusing on tasks, and (c) digital learning logs supported student learning by emphasizing learning. Figure 4.9 presents the overarching theme and category groupings. The following section will present and define each of the three themes and aligned categories.

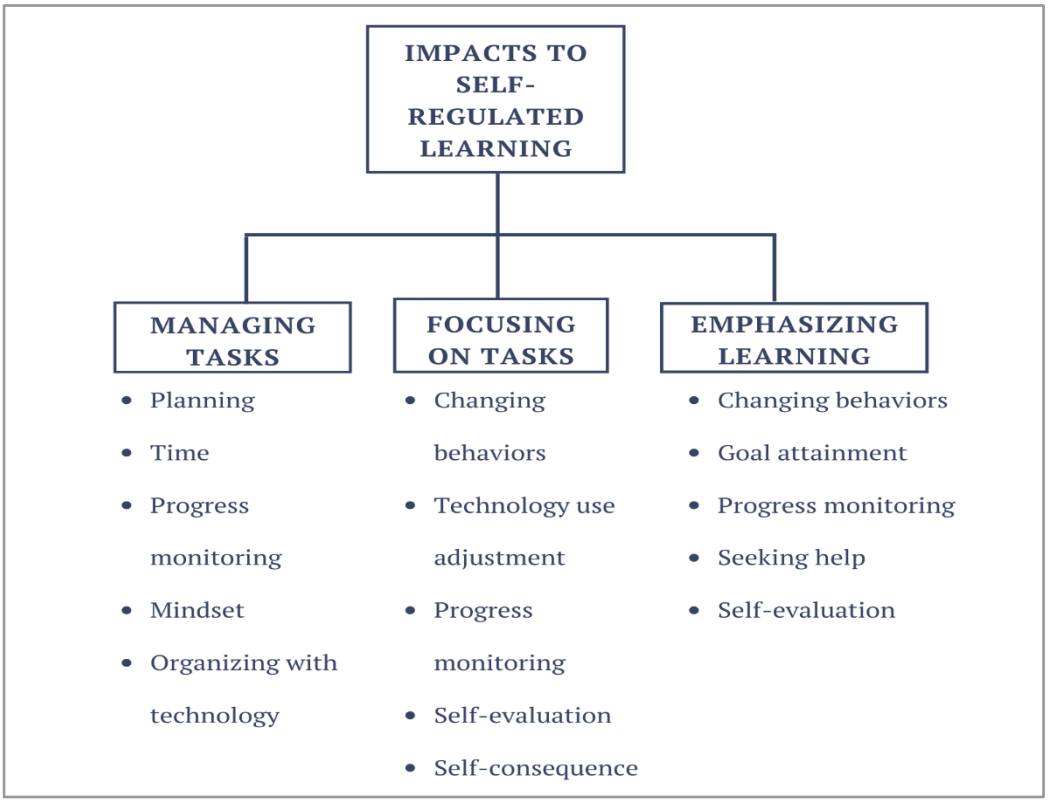


Figure 4.9. A graphic organizer of emergent qualitative themes and categories.

Theme: Digital Learning Logs Supported Student Learning by Managing Tasks

The first major theme emerging from the qualitative data analysis was the prevalence of managing tasks to support student learning. For this study, the theme "Digital Learning Logs Supported Student Learning by Managing Tasks" attributes concrete actions taken for task execution, including completion, productivity, and planning of tasks, as well as feelings and affectual goals associated with task completion.

Use of learning log as documentation for daily plans in class, and reflection to better prepare for upcoming plans, create an overall emphasis on tasks that comprise student plans. Management of task is the first and most concrete product of digital learning log use. At the center of the SRL cycle of forethought, performance control, and reflection are tasks completed to support or evidence learning (Zimmerman, 2001; Zimmerman, Schunk, & DiBenedetto, 2015). The goal-setting, outcome expectations, and self-evaluation happening through learning logs support metacognitive processes within SRL (Efklides et al., 2018; Schunk & DiBenedetto, 2020). For these reasons, it is natural that "Digital Learning Logs Supported Student Learning by Managing Tasks" would emerge as a theme in student learning logs and interview responses. Prior studies also describe the relationship between increasing intentional reflection, like using a learning log, and effective management of tasks (Boekaerts & Corno, 2005; Cleary et al., 2012; Cleary & Zimmerman, 2004; Schmitz & Wiese, 2006).

The following section will describe the analytical trail for "Digital Learning Logs Supported Student Learning by Managing Tasks" theme development and its supporting categories. Analysis of interviews and log reflections highlighted the use of (a) planning, (b) managing time, (c) organizing with technology, (d) progress monitoring, and (e)

positive impact on affect the impact of learning log use through managing time, as presented in Table 4.6. Where applicable, subcategories are described.

Table 4.6 *Theme, Category, and Codes Alignment for Managing Tasks*

Theme	**Category**	**Codes**
Managing task	Positive impact on affect (9)	● Decreased stress (4) ● Feeling of readiness (5)
	Planning (25) a) Self-improvement (10)	● Planning for academic improvement/grades (4) ● Planning to improve work habits (6)
	Planning (25) b) Tasks (15)	● Planning for immediate tasks (6) ● Planning for upcoming tasks (7) ● Prioritizing task components (2)
	Managing time (26) a) Negative (4)	● Negative impact on time (4)
	b) Positive (8)	● Positive impact on time (8)
	c) Productivity (14)	● Supporting balance (4) ● Supporting productivity (10)
	Organization with technology (8)	● Increasing practice (1) ● Keeping up with tasks (2) ● Managing websites/links (3) ● Adjusting tabs/toggling (2)
	Progress monitoring tasks (7)	● Feeling on pace to the plan (3) ● Monitoring outstanding task elements (4)

Planning. Learning logs allow students to document plans and evidence any forethought that occurred for task completion. Planning is a critical component of forethought within the SRL cycle due to a learner's need to be aware of goals (Cleary & Zimmerman, 2004; Hoyle & Dent, 2018; Willis & Mason, 2014). In interviews, students described how planning supported task management. Student 3 shared, "What I write on

the log dictates what I will be doing that day during personalized time." In the *planning* category, codes about managing tasks fell into two main subcategories, (a) planning for tasks and (b) planning for self-improvement.

Planning for task details. Planning for tasks occurred in two primary ways: planning for the day and planning for the next day. The following examples demonstrate planning for the day by listing what needs to be done, organizing class time, and creating a schedule.

Student 12:	When I know all that I need to do, then I can portion out my 1hr and 30min so I can finish all my work in that time frame. (Week 6 log)
Student 3:	I write what I am going to do that day and complete it. (Interview)
Student 11:	I use my learning log to keep me on pace with what needs to be done, for example, if I don't finish something one day, I will put it on my learning log to complete the next. (Interview)

Planning for the next day included moving incomplete tasks from the day to the plan for the next day and planning ahead for anticipated learning needs.

Student 1:	I use it to plan which videos I will watch for the next day. (Interview)
Student 3:	I write what I did that day in class, then I will write what must be completed tomorrow. (Interview)
Student 5:	Tomorrow, I need to work on 4.2 and maybe take the quiz for 4.1. (Week 3 log)

Similar to prior research, some students noted the process of planning and having the plan on hand supported feeling more on task (Corno, 2001; Schmitz & Wiese, 2006; Zimmerman et al., 2015). For instance, Student 14 shared in the interview:

Student 14:	I use it as a starting point to help work at doing what I need to reach my goals.

Other students noted the plan supported prioritizing components to complete multiple tasks. In all, these actions show students emphasizing *planning for tasks* to better support successful task completion.

Planning for self-improvement. Comments categorized as *planning for self-improvement* or personal affect referenced general academic goals, work habits, and mindset. The following are examples of students planning for self-improvement:

Student 5:	It [the learning log] impacts me during class because I know I set certain standards for myself in the class (Week 3 log)
Student 11:	My plans of my improvements are to pass all my classes this semester, pull all full effort in school, keep the same positive attitude, work hard, choose my time wisely and make sure that all assignments, homework, projects are to be done at home and be ready to be turned in, in the morning for class. (Week 6 log)
Student 13:	I used to be very bad at time-management, especially when it came to watching videos, I still am, but when using the learning log, I decided if I put something down, I had to do it. (Interview)

Planning for academic achievement and setting intentions for work habits are overarching goals that impact choices students make during work sessions (Hoyle & Dent, 2018). Planning for affect increases motivation to adjust behaviors needed for self-improvement and development of SRL skills (Efklides et al., 2018). Student intentions to be active participants in their personal development aligns with the principles of social cognitive theory, a primary theory aligned to SRL (Bandura, 1986). Setting goals regularly through the use of learning logs reminded students of the affectual elements

successful task completion requires, leading to goal setting beyond simple steps to complete tasks.

Managing time. Specific references about the use of time generated the category of *managing time*. Students regularly cited *managing time* as support for achieving success with tasks. Several comments directly used the term *time* when describing the impact of using learning logs. This report is consistent with prior studies that found students who utilize reflection, such as within learning logs, are more effective with time management (Boekaerts & Corno, 2005; Cleary et al., 2012; Wilson & Narayan, 2016). The *managing time* code was applied more than any other, for a total of 26 times. Four students initially reported the use of learning logs to have a negative impact on time, but later overwhelmingly 22 students reported a positive impact on time. Students described the impact of *managing time* to include productivity and life balance. In all, three subcategories comprise the category of *managing time:* (a) negative impact on time, (b) positive impact on time, and (c) supporting productivity with time.

Negative impact on time. Due to the new nature of implementing the innovation, four students reported a negative time on their time in week one learning log reflections. Negative impacts noted included being frustrated with adjustments to the class time needed for completing the logs. Student 8 expressed frustration in the week one log by stating:

> Student 8: I feel like we could've had a little bit more time to do our work, so we actually can complete it, instead of working on the log chart.

Similarly, in week one, frustration focused on the inconvenience of using the time to complete the logs:

Student 12:	We didn't get to finish our work because we had to do the learning log.

Both are examples of learning log reflections from week one the expressed negative feelings about doing learning logs because filling them out impacted class time previously used for other work.

Positive impact on time. In all subsequent weeks, students commented positively about how the log helps to manage time and be more productive. All eight interview comments about managing time regarded the use of the logs as positive support. Positive comments from the interviews included:

Student 1:	I waste less time.
Student 11:	I could not afford to waste time if I was going to complete my plan.
Student 4:	Learning logs have become very useful and improved how I manage my time with work and also keeping good grades in school.

Similarly, in prior studies conducted with low student to computer ratios, promoting SRL strategies increased time management for previously unmotivated students (DeVore et al., 2017; Poitras & Lajoie, 2018). In this study, after students spent a six week duration in the innovation period using logs, the logs became a useful tool and were reported to improve time management.

Supporting productivity with time. Specifically, students noted feeling more productive and prepared to balance work, home, and school. Ten student thoughts about increasing productivity were shared during the interviews, indicating productivity was something that stood out to students at the end of implementation. Some examples of referencing productivity shared in the interviews include the following:

Student 3:	I get more work done on time.
Student 12:	I notice that I tend to get more important work done because it is all laid out; that way, I know what I need to do.
Student 14:	I get more work done when I follow my learning logs.

By improving productivity, four students shared they felt more balanced with their overall time. For example, Student 11 shared in the interview, "I use my learning log to help keep up with homework and balance my time with work and practices. I can have enough time to study for the upcoming test or assignment." Students were sharing positive remarks about personal ability to manage time and achieve success with tasks ties to motivation and willingness to further engage with learning (de Palo et al., 2017; Efklides et al., 2018; Moos & Stewart, 2018).

Organizing tasks with technology. Comments in this category focus on changing technology used to support task management. Changes include how tabs and links are used, insights about the effectiveness of various types of websites, supporting access to additional practice, and keeping up with tasks. For instance, the following student describes a strategy developed for organization and awareness of learning resources:

Student 4:	I always had so many tabs open in a random order, so I decided to make four different sections so it would be more organized, and so I would know where everything is. (Week 6 log)

Student 6 felt supported by readily available resources accessible on the Chromebook to support evaluation of learning and note review:

Student 6: When I was on my Chromebook, I looked back over my notes and practice problems when I realized I wasn't quite understanding something. (Interview)

By using the digital learning log, Student 3 described increased management of tasks:

Student 3: Keeping my learning logs digitally makes me use my Chromebook more than usual to keep up with the tasks I have to do. (Interview)

Student 3 also shared in the interview how the digital log supported toggling between the task and the plan, "As long as my assignments are also on my Chromebook, I like being able to go back and forth between my assignment and my log." Similar to prior studies in technology-rich environments, students increased access to, and awareness of task management led to them seeking opportunities to increase the effective use of technology for task achievement (Greene et al., 2015; Moos, 2018).

Task progress monitoring. One way students monitored their progress toward their goals was keeping track of outstanding tasks and referencing logs along the way to see unaccomplished work. For instance, in week two early reflections understood monitoring progress toward goals was a key aspect of log use:

Student 11: So, my goal from the learning log is to be able to meet them (the goals).

About midway through the innovation in a week four reflection, there was also a mention of feeling behind because tasks are monitored, but not always accomplished as planned. Mirroring prior studies, this shows students increasing ownership and personal responsibility for accomplishing tasks after engaging digitally with the SRL cycle (Dabbagh & Kitsantas, 2013; Edens, 2009; Shyr & Chen, 2017). Near the end of implementation at week six, the following student described a positive impact of using digital learning logs:

Student 1:	I have been using my log to keep me on track while I'm doing my work, so I don't get behind.

This example demonstrates a student's use of progress monitoring to increase self-management.

Positive impact on affect. Students reported the learning log was a structure and support for managing tasks that lead to feelings of improved affect, including decreased stress and increased readiness. Prior studies reported digital access, and unregulated device use in the classroom resulted in increased social anxiety and academic procrastination, while SRL decreased (Andersson et al., 2014; Durak, 2018; George et al., 2018). Regarding stress, with the support of digital learning logs, students noted feeling less overwhelmed, less rushed, and less stressed in general, as evidenced by the following statements:

Student 4:	Having multiple things to do on it at once and being overwhelmed and having to take a step back before diving back in. (Week 5 log)
Student 11:	When we watch flip grid videos, I will put on my learning log what videos need to be done by when and what days are best to start them so that I am not in a rush and will have plenty of time to complete them successfully. (Interview)
Student 14:	It helps guide you through times when you have a lot of work, and you don't feel like you can do it by helping keep you in line and focused on the task at hand. (Interview)

Regarding readiness, students report using the learning log, and knowing a plan was in place for the task resulted in feeling more ready to take assessments, complete work, and prepare for the next day. For instance, a student wrote in the week three log:

Student 8: I know what I am going to do that day through my learning log, and this helps me get prepared to ask questions on things I don't understand.

The following student made a similar statement during interviews:

Student 1: It helps me be ready and know what I need to do each day.

These comments, plus findings from other studies, demonstrate the potential for positive outcomes regarding affect and SRL in digitally rich learning environments (Azevedo et al., 2018; Dabbagh & Kitsantas, 2013).

Theme: Digital Learning Logs Supported Student Learning by Focusing on Task

Learning log impact on student focus to support learning tasks is a central purpose of this research. Performance control is the phase of the SRL cycle (i.e., forethought, performance control, and reflection) in which tasks and activities occur. Using the learning log reflection section, students provide insight into performance control choices made during the lesson. Providing structure and support within lessons for SRL has previously shown an increase in motivation for task focus and student performance (Cleary et al., 2018; Efklides et al., 2018). Similar to this research, these studies seek to enhance the overarching goal of SRL by developing and optimizing student's ability to demonstrate self-control and support goal attainment (Pellas, 2014; Paris & Paris, 2001; Zimmerman, 2011). Students productively focusing on a learning task, also known as volition for learning, is the pivotal lever to move from planning to achievement (Boekaerts & Corno, 2005; Hoyle & Dent, 2018; Kim & Bennekin, 2016). Students in this study did specifically reference changes in behaviors and technology use, as well as the implementation of performance control strategies. Categories indicating specific

changes in focus or use of performance control strategies such as progress monitoring, self-evaluation, and self-consequence are grouped into this theme.

The following section will describe the analytical trail for "Digital Learning Logs Supporting Student Learning by Focusing on Task" theme development and its supporting categories. Analysis of interviews and log reflections highlighted (a) changing behaviors, (b) impact on technology use, (c) progress monitoring, (d) self-evaluation, and (e) self-consequence, as presented in Table 4.7. Subcategories are described where applicable.

Table 4.7 *Theme, Category, and Codes Alignment for Focusing on Tasks*

Theme	**Category**	**Codes**
Focusing on task	Changing behaviors (18) a) Positive (17)	● Improving work habits through focus (5) ● Increasing the ability to focus on a task (2) ● Overcoming time management issues (4) ● Prompting task focus (6)
	b) Negative (1)	● Increasing off-task behaviors (1)
	Technology use (8) a) Improving focus (5)	● Discontinuing device use (2) ● Overcoming functionality issues (3) ● No change (3)
	b) No change (3)	
	Progress monitoring (13) a) Reminders (4)	● Using as a reminder (4)
	b) Attention (9)	● Feeling "on track" (3) ● Feeling less distracted (1) ● Feeling more focused (5)
	c) Mindset (3)	● Monitoring personal mindset (3)

Theme	Category	Codes
	Self-evaluation (effort) (10)	● Judging personal work habits (7) ● Self-evaluating attention (3)
	Self-consequence (5)	● Increasing self-pressure (4) Requiring self-attendance at intervention period (1)

Changing behaviors for focus. Under the theme of "Digital Learning Logs Supporting Student Learning by Focusing on Task," students noted choices to make behavior changes. In this study, analysis of log entries and interviews found 18 student comments about changes to be noted as positive, while one was negative.

Positive behavior changes. Positive changes impacting focusing on tasks include using the log as a prompt for work habits and focus, overcoming time management issues, and general choices to increase prioritizing tasks. In prior studies, students trained to use short cycle goal-setting noted making adjustments to actions and methods to improve performance (Miller & Bernacki, 2019; Wilson & Narayan, 2016; Zimmerman et al., 2015). Students in this study referenced via learning log reflections and interview comments that personal work habits improved. For instance, one student described how the log prompted the use of spare time to further goal attainment:

> Student 12: Let's say I put on my learning log that I wanted to finish watching a video by the next day, when I have a spare minute in class I could watch some to get closer to finishing it, instead of not doing anything. (Interview)

As early as week two reflections, a student referenced personal changes in behaviors:

> Student 4: When I'm on my Chromebook, sometimes I want to work on things for other classes, and I remember what my goals were, so I decide to keep on working on that instead.

Similarly, in an interview, a student articulated choosing to be task-focused instead of talking:

> Student 1: I can just look at what I recorded in my learning log rather than talking.

Also, during interviews, a student described changes concerning time on task:

> Student 13: I feel like my own pre-existing problems involving time-management are the real problem getting in the way of me managing my tasks, but when I use the learning log, it helps.

In all, these behavior changes demonstrate students using the log to prompt, making choices to stay focused on tasks. By making choices to stay focused on tasks, students increase the likelihood of goal attainment and a positive impact on learning.

Negative behavior changes. A negative comment made during the interview described the digital version of the log as more of a distraction because it provided digital access to more off-task choices available on the device.

> Student 12: Sometimes, when I log into my learning log, it causes me to use my Chromebook for things than other assignments. (Interview)

This student exemplifies complaints about technology in the classroom made in numerous studies cited in this research (e.g., Andersson et al., 2014; Durak, 2018; Perry & Steck, 2015; Sahin et al., 2016). Positively, the student has recognized the impact of digital distraction on task achievement. Potentially additional coaching, targeted goal settings, or use of paper-based learning logs could be useful for this student. Digital learning logs are a tool to support student task focus. When targeted strategies are not working for the overall goal, it is important to switch to other supports for SRL to best support the student.

Changing technology use for focus. Statements selected for the category of *changing technology use for focus* due to referencing how using networked resources on Chromebooks impacted focus. As stated in the previous subcategory, access to networked resources, particularly in classrooms, can provide students additional opportunities for distraction. This category demonstrates how students adjusted or did not adjust, the technology used to achieve greater focus on learning tasks. The majority of comments in this category described the changes making a positive impact on focus. Three comments shared that while the digital log did change digital resource use, there was no impact to focus.

Changes improve focus. This subcategory included student references to choices made with the technology to support focus. Similar to the use of learning logs in this study, prior studies found when students specifically plan for their learning and then monitor their learning, they are more likely to mitigate distractions online (DeVore et al., 2017; Greene et al., 2015; Poitras & Lajoie, 2018). By completing the cyclical SRL process in multiple cycles, students came to know personal pitfalls and the strategies that were working best. Multiple cycles led to students describing how they chose to make changes to better support focus in their reflections and interview sessions.

Six positive comments about changes to improve focus include looking at the log as a prompt for work and discontinuing distracted use. For instance, the following student described specific steps he took to refocus:

> Student 4: To get done with my work, I stopped playing games, and I shut it off and did the rest of my work. (Week 3 log)

Students also showed growth in awareness of strategies to improve focus, such as the following statement:

> Student 12: Well, some strategies help me more than others, like, I think I work better on paper than on the Chromebook, so usually, if there is a way for me to do the work on paper, I do. (Interview)

Three students described a commitment to using the logs even when there were technical Chromebook issues, by creating paper logs to structure a work plan. By articulating choices being made about technology use to support focus, students are taking ownership of their learning environment and demonstrating their ability to regulate it.

Changes do not affect focus. Two statements described digital log use did not impact networked resource use. Primarily these student comments focused on use not changing, such as:

> Student 11: I've never really had a time when I used my Chromebook differently when doing a learning log other than the fact that I had to fill the learning log out on my Chromebook. (Interview)

Students seemed to view the question about change very literally and simply emphasized device use was the same way it always had been.

Self-monitoring for focus. Codes in this section are categorized as *progress monitoring for focus* when comments related to students monitoring personal deficiencies and determining actions needing adjustment to support focus. Students in this study pushed to self-monitor for focus through the innovation due to log entry self-ratings about the use of the action plan, effort regulation, time management, and learning goal progress. By self-rating directly before reflecting, students were in a mindset of analyzing choices that were made during the lesson to support focus. In prior studies, structured

diaries, the basis of learning logs used in this study, have been found to positively impact student self-monitoring (Panadero et al., 2016; Schmitz & Perels, 2011; Schmitz & Wiese, 2006). While self-judgment may seem to align more with self-evaluation, through the process of regular log entries, students expressed how they monitored and adjusted strategies during the work session to achieve enhanced focus. Overall, the subcategories evidenced below most aligns with students increasing task outcomes and performance control by monitoring and protecting the intention to learn (Boekaerts & Corno, 2005; Kim & Bennekin, 2016; Schlüter et al., 2018). Through analysis of learning log reflections and interviews, three subcategories emerged when all codes were analyzed, (a) monitoring for attention, (b) monitoring focus with reminders, and (c) monitoring personal mindset.

Monitoring attention. Siz codes classified as *monitoring attention* focus on adhering to the work at hand, avoiding distraction to stay on task, and focusing on what to do.

Student 6:	I could look [in the log] at what I thought about a topic earlier on and be more focused on my work. (Interview)
Student 8:	I am using it to track what I am doing and to make sure I don't get distracted in class. (Week 6 log)

In both instances, students are taking advantage of the forethought planning documented in the log to impact performance control during the work session. Students are making attention to the task a priority by physically looking at log goals during the lesson and using that as a motivator for goal attainment. In this way, learning logs support progress monitoring by providing a visual cue for attention to tasks.

Monitoring with reminders. Students noted using the log as a reminder in learning logs week one and five, as well as during the interviews. In prior studies, students reported using self-monitoring to remind themselves of their goals and noting distractions to avoid to support staying on task (Tagsold, 2013; Terry et al., 2016; Wills & Mason, 2014). In this study, examples shared regarding monitoring focus with reminders include five statements that specifically mention reminding self about the task, or what to do. In week five, Student 6 reflected, "I have to remind myself what I'm doing and focus on my work." Another example stated by Student 1 during the interview is, "I use it (the learning log) to remember what I am supposed to be doing." Referencing the logs during class was not mandated. Instructions focus on using them for pre- and post-lesson plans and reflections. Students chose to use the log as a reminder, indicating it was a useful tool to have on hand as a support for focus.

Monitoring personal mindset. Codes were selected for the category of *monitoring personal mindset* because they included students describing having a positive mindset or attitude. Similar to previous studies, students express a positive correlation between attitude, or mindset, about task and performance on tasks (Azevedo et at., 2018; Pennypacker-Hill, 2013). In this study, referencing a monitoring mindset occurred during learning log reflections. An example made in week two is, "I got confused and got set back, pushed through anyway" (Student 6). In week five, Student 13 stated, "I need to work hard, make sure all my work is turned in on time, always have a great mindset, and always have a positive attitude." These are examples of students recognizing the importance of a positive mindset to achieve greater focus and outcomes for tasks. By

developing recognition of the impact of mindset, students choose to strengthen their mindsets and further the motivational component of SRL.

Self-evaluation of focus. Student's comments coded here referenced the use of self-evaluation to support focusing on the task. Self-evaluation aligns with the reflection phase of SRL consistently, even in early studies, as it provides learners the opportunity to judge choices and personal effectiveness to determine needed changes that could improve outcomes (Cleary & Zimmerman, 2004; Zimmerman, 1989; Zimmerman & Martinez-Pons, 1986). More current research continues to emphasize the need for self-evaluation to develop SRL skills (Dabbagh & Kitsantas, 2013; Efklides et al., 2018; Moos, 2018; Schunk & DiBenedetto, 2020). In this study, there were two instances of students making general comments about feeling the log was useful for self-evaluation to say on task.

Student 5:	I needed to work on getting started. (Week 3 log)
Student 8:	I know I have to pay more attention and ask questions. (Interview)

All other comments focused on the self-evaluation of effort placed on completing the task. Overall, self-evaluation comments about effort centered on work habits and attention. Using self-evaluation generated the following realizations about personal work habits:

Student 8:	If I would have taken my time, I could have got a better grade. (Week 4 log)
Student 3:	I also write the efficiency of how I worked that day. (Interview)

All these examples demonstrate students using learning logs to be introspective and self-evaluate performance related to focusing on the task. By increasing the implementation

of self-evaluation, students determine the skills that need to be enhanced and choose to make changes that ultimately grow their abilities as self-regulated learners.

Self-consequences to promote focus. Some students referenced using self-consequence to support focusing on the task. Self-consequence typically occurs in the progress monitoring phase as students make undesirable choices to enhance focus, such as moving away from friends, or during the reflection phase when students realize they must place interventions on themselves to achieve their goals (Corno, 2001; Karabenick & Gonida, 2018; Zimmerman, 2011). Examples of self-consequence include attending academic intervention, creating deadlines, increasing self-pressure, and requiring self to do more practice problems. For instance, the following students wrote about mandating consequences for themselves based on incomplete work and learning needs:

Student 13:	Tomorrow, I'm going to halftime to finish the quiz. (Week 3 log)
Student 11:	I have made myself do more practice from websites to help learn the material. (Week 6 log)

These examples demonstrate students choosing to mandate support for themselves. Extra steps like practice and tutoring divert time spent on personal interests to enhancing performance on a learning task. In this way, providing self-consequence increases the learner's task focus, and promotes opportunities to improve achievement.

Theme: Digital Learning Logs Supported Student Learning by Emphasizing Learning

As students increase self-regulation for learning, it is natural for students to express and place a greater interest in learning. The emergent theme of “Digital Learning Logs Supporting Student Learning by Emphasizing Learning” was the most unexpected

of the three emerged themes. However, expectations should have anticipated an outcome with some relationship to learning due to multiple education domains including math (Cleary et al., 2017), English (Griswold & Ruckert, 2018), science (Greene et al., 2018), social studies (Moos & Stewart, 2018), physical education (Kitsantas et al., 2018), and language acquisition (Chamot, 2018), all reporting students who demonstrate higher self-regulation also to demonstrate higher academic achievement. In this research, task management and increased focus were the expected outcomes due to the nature of the innovation emphasizing planning and performance control. Evidence of emphasis on learning demonstrated students increasing metacognition with personal learning goals, needs, and outcomes, resulting in an overall increased emphasis on learning.

The following section will describe the analytical trail for the "Digital Learning Logs Supporting Student Learning by Emphasizing Learning" theme development and its supporting categories. Table 4.8 shows categories and codes used to generate the theme. Categories aligning to an emphasis on learning are (a) learning goal attainment, (b) self-evaluating learning needs, (c) changing behaviors for learning, (d) monitoring learning progress, and (e) seeking help. Subcategories are described where applicable.

Table 4.8 *Theme, Category, and Codes Alignment for Emphasizing Learning*

Theme	**Category**	**Codes**
Emphasizing learning	Changing behaviors (10)	● Asking more questions (1) ● Helping others learn (2) ● Increasing note review (3) ● Prioritizing learning (4)
	Goal attainment (23)	● Feeling more successful (3) ● Supporting goal attainment (4) ● Monitoring achievement (2) ● Monitoring pace (3) ● Accomplishing task (11)

Theme	Category	Codes
Emphasizing learning	Progress monitoring (18) i) Reviewing notes (8)	● Increasing vocabulary review (3) ● Prioritizing studying notes (2) ● Using notes to identify learning needs (3)
	ii) Tracking mastery (8)	● Performance tracking (8)
	Seeking help (13)	● Feeling more prepared to seek help (4) ● Prompted seeking help (9)
	Self-evaluation: Learning (8)	● Identifying specific learning needs (8)

Learning goal attainment. *Learning goal attainment* categorizes codes into this label due to students expressing they are monitoring their progress toward accomplishment and achieving set goals. By progress monitoring goal attainment, students are more likely to sustain focus and achievement of goals (de Palo et al., 2017; Schunk & DiBenedetto, 2020). Examples from student responses in this study include students indicating they have gotten done on a task or action plan, positive feelings about success, turning in work, being on pace, and overall accomplishment of work. Twelve times students specifically referenced and listed accomplishments. For instance, during an interview, a student explained this overall process of using the log for attainment documentation, future planning, and learning:

> Student 12: Each time I fill out information, usually day by day, and fill in what I've done, what I complete, what I want to complete the next day, and how I think I did on my work that day.

Similar to prior studies, an emphasis on goal achievement demonstrated an increased focus created goals related to improving learning, rather than just

accomplishing tasks (Moos & Stewart, 2018; Pellas, 2014). Describing the role of learning in the use of learning logs occurred in the interview in the following way:

> Student 1: I use my learning log to track my learning and goals I have for my learning.

Student 3 demonstrated an evolution of thinking during reflections, seen in the following mindset shift from general to explicit:

> Student 3: I feel like I was successful today, and I understood this better than yesterday. (Week 3)
>
> Student 3: Today was a great day for me because I achieved my learning goal and action plan for today. (Week 6)

In all, these statements demonstrate an emphasis on learning achievement as a by-product of goal setting and attainment.

Self-evaluating learning needs. The emphasis on the learning category of *self-evaluation for learning needs* includes student statements that reflect on the use of logs to support personal learning needs. Self-evaluation is a critical component to identify areas for improvement to act upon them and develop self-improvement within the social cognitivist theory (Bandura, 2001; Schunk & DiBenedetto, 2020). Studies in technology-rich environments with unlimited internet access support the promotion and use of self-evaluation strategies to aid in the development of SRL and support learning (Dabbagh & Kitsantas, 2013; Moos, 2018).

In this study, student statements emphasize the role of the learning log as a self-evaluation tool for identifying needs and supporting learning. Students explained the purpose of using the learning log as a tool to enhance learning by stating:

> Student 8: I know what I am going to do that day through my learning log, and it helps me get prepared to ask

questions on things I don't understand, or I can also help others if they don't know what they are doing. (Week 3 log)

Student 6: I looked back over my notes and practice problems when I realized I wasn't quite understanding something. (Interview)

These students identified weaknesses independently and implemented plans, like note review and collaboration, to support learning growth in real-time.

Changing behaviors for learning. This category is about a positive change in behaviors that focus on improving student learning. Key indicators referenced an increase in asking questions, asking for help, reviewing notes, and studying. Foundationally, improvement of learning behaviors is a key goal for SRL (White & DiBenedetto, 2018; Zimmerman, 1989). Outcomes finding positive change in learning behaviors are related to prior studies focused on SRL, as findings indicate students who received feedback and support for volition strategies from their teachers had positive trends in attitude toward their subject area and study habits (Kim & Bennekin, 2013; Kim & Keller, 2010). Beginning in logs from week two recognition of change was noted by a student reflecting the following within the learning log reflection:

Student 11: I decide which topics to study more than others.

In the week three learning log reflection, a student articulated the strategy to be employed to enhance learning:

Student 8: This helps me get prepared to ask questions on things I don't understand.

By week four, while brief, the following student referred to the log providing motivation and changing actions:

Student 11: This is making me do my notes and review.

At the end of implementation in week 6, the following student described the overall impact to learning habits from the application of learning logs:

> Student 6: I have noticed that I have been more on top of things and have studied more.

These references all demonstrate students noting a change in behaviors. Additionally, the progression from week two to week six showed students making general comments about studying more, and growth in the articulation of specific strategies implemented.

Monitoring learning progress. Codes placed into the category of *monitoring learning progress* include students identifying and tracking development to improve personal learning. Progress monitoring is a core skill within the SRL feedback loop of forethought, performance control, and reflection (Hoyle & Dent, 2018; Zimmerman, 2001). The category at large includes general comments about improving overall learning and commitment to learning. Subcategories include, (a) reviewing notes, and (b) tracking mastery.

Reviewing notes. As a part of *monitoring learning progress*, students indicated notes review was a critical element to support learning. Similarly, prior research findings indicate self-monitoring the use of resources increases student volition for learning, thereby impacting student learning characteristics (Corno 2001; İlhan-Beyaztas & Metin, 2019; McCann & Turner, 2004). Overall there were nine specific mentions of needing to review notes to support learning. Descriptions of reviewing notes focused on becoming a more successful learner by reviewing notes, studying more, or completing a mistake analysis.

> Student 8: Now that we have gone over it, I see all my mistakes, but some of the questions I got wrong, I

	could have got right if I would have taken my time. (Week 4 log)
Student 5:	Vocabulary was new; I need to review vocabulary. (Week 5 log)
Student 6:	I have discovered that I wasn't very confident in a specific topic and wrote a little more detail about it in my notes. (Interview)
Student 11:	When I did not fully understand something, I would always refer back to my learning log and decide which topics to study more than others. (Interview)

By monitoring learning needs and making specific personal recommendations, students are developing and understanding themselves as learners. Identifying the need for note review, and hopefully following through, provides students the opportunity to experience growth in learning as a result of these learning-centered choices.

Tracking mastery. In this subcategory, codes selected include student monitoring of personal learning progress through documentation of learning successes and weaknesses. Success tracking is a SRL self-evaluation skill useful to support learning because it provides students clear benchmarks for goal setting and achievement, even specifically in technology-rich learning environments (Kitsantas & Cleary, 2016; Moos, 2018). Students describe their understanding of content, growth, weakness, and self-ratings of learning.

Student 1:	I have been keeping track of my mastery. (Week 4 log)
Student 6:	I look at topics we have covered and determine if I understand them. (Interview)
Student 11:	I use it to track where I was at the beginning of a unit, then I compare it to where I am now to see how much I've grown in knowledge. (Interview)

Each of these students voices a focus on tracking and growing learning. Interestingly, instructions for the student logs were to focus on plans, effort, and task achievement. Students adapted the logs to include mastery tracking as a support for greater task achievement, as well as evidencing increased achievement due to increased focus.

Seeking help. Coding for *seeking help* included student's statements that expressed a desire to seek help to support learning. Seeking help is an important strategy utilized to support SRL, particularly for underachieving students due to the nature of social interaction, learning focus, and intentional support seeking help requires (Chowdhury & Halder, 2019; Karabenick & Gonida, 2018; Mustami, 2019). Thirteen statements coded were positive about the impact of seeking help to further learning. The following examples represent students indicating the logs supported preparedness to ask questions, and prompted seeking help.

Student 8:	This helps me get prepared to ask questions on things I don't understand, or I can also help others if they don't know what they are doing. (Week 3 log)
Student 6:	I saw that I didn't understand the answer to a certain problem and asked to go over it. (Interview)
Student 4:	I think so because it helps you manage your time and reminds you that if you need help with something, then to take advantage of the time available and seek that help you need. (Interview)

One student explicitly indicated what help was needed, "I need a more in-depth explanation of the project." (Student 5, week 2 log). Willingness to ask questions demonstrates placing a value on learning growth. The log provided a digital place to note questions, and a reminder to check on those questions, keeping productive learning central to maintain task focus.

Summary

This chapter presented findings from this mixed-methods study. Quantitative data in the form of pre- and post-surveys of SRL skills, as well as log entry self-ratings of SRL skills, were presented, along with corresponding descriptive and inferential statistics. Overall, all subscales identified the implementation of learning logs to be statistically significant. Qualitatively, descriptions provided included the coding and inductive process for analyzing data from learning log reflections and interviews. Three emergent themes from the qualitative analysis were presented and described through categories using details from participants' own words. The emergent themes presented were (a) digital learning logs supported student learning by managing tasks, (b) digital learning logs supported student learning by focusing on tasks, and (c) digital learning logs supported student learning by emphasizing learning. Where applicable, the inclusion of prior research informed and enhanced the themes and categories presented. Throughout, relaying instances of peer debriefing and member checking occurred.

CHAPTER 5

DISCUSSION, IMPLICATIONS, AND LIMITATIONS

This chapter positions the findings with the literature on SRL strategy intervention to support student's performance control in technology-rich environments. The purpose of this action research was to evaluate the impact of digital learning logs to support SRL for high school students of average achievement who have individual access to digital connectivity within the classroom. Three primary themes emerged from the data analysis (see Figure 4.9). Students demonstrated the development of performance control through managing of tasks, focusing on tasks, and emphasizing learning. Data collection and analysis occurred with both quantitative (i.e., MSLQ subscale pretest-posttest and learning log SRL skill self-rating) and qualitative (i.e., learning log reflection entries and student interviews measures. This chapter will present related (a) discussion, (b) implications, and (c) limitations of this research.

Discussion

It is important to situate the findings of this research within the context of SRL strategy support to develop performance control for task-related device use. Quantitative and qualitative data were considered through a lens of digital learning log implementation outcomes for metacognitive SRL skills, performance control, and task-related device use to answer research questions. Using literature also helped to explain student shifts in SRL skills and outcomes. This discussion section is organized by the three primary research questions of this study.

Research Question 1: How and to what degree does SRL strategy support affect metacognitive SRL skills?

SRL is defined in this research as the metacognitive, motivational, and behavioral direction of one's learning toward set goals (Paris & Paris, 2001; Zimmerman, 1989). While motivation is a core component of SRL, this research focused on the learning strategy skills students use to enhance performance control, supporting task-related device use. Additionally, a prompt for this study came from prior research stating, "No known studies have empirically considered student-held metacognitive awareness in concert with technology use or preference for multitasking" (Terry et al., 2016, p. 243). As a result of this study, answers to question one are presented as (a) increased self-rating of metacognitive SRL skills, (b) use of metacognitive SRL skills, and (c) conclusion.

Increased self-rating of metacognitive SRL skills. Based on student growth in self-rating and pretest to posttest results, overall student metacognitive SRL skills improved. Metacognition emphasizes a learner's ability to use strategies for planning, monitoring, and self-evaluation during learning (Brown et al. 1983; Tock & Moxley, 2016). Encouraging the development of metacognitive SRL skills is a hallmark of numerous SRL studies (Edens, 2009; Shea & Bidjerano, 2010; Shyr & Chen, 2017; Terry et al., 2016), due to the primary components of SRL being metacognition and motivation (Paris & Paris, 2001). Additionally, this study corroborates findings from a related study by Harley et al. (2018), where significant learning gains occurred from interaction with digital SRL prompts for setting goals and responding to computer provided feedback.

The ability to develop SRL skills was a key component of this study. Prior studies have found some students demonstrate high use of SRL skills without any intervention or

training (Borkowski & Thorpe, 1994; Zimmerman, 2002). Additional studies found students who identify as using SRL skills more frequently are higher achieving students (Chen et al., 2018; Schlüter et al., 2018; Wagaba et al., 2016; Zimmerman, 2011). Since all learners do not readily demonstrate frequent use of SRL skills, support strategies have been researched to develop SRL in learners. For example, in work by Cleary and Zimmerman (2004), researchers used prompts and feedback for students who need additional support to develop SRL skills.

In this study, the greatest growth occurred in the student's perceptions of metacognitive SRL. Metacognitive SRL began as the lowest pretest mean (M = 3.51, SD = 0.99). While demonstrating the greatest growth, this subscale also had the lowest posttest mean (M = 5.95, SD = 0.54). Results from the t-test indicated that the mean posttest score was significantly higher than the mean pretest score, indicating the use of digital learning logs had some effect on students' perceptions of their metacognitive SRL skills. Some student statements referencing thinking about learning while using learning log include; in week three, Student 8 stated, "This helps me get prepared to ask questions on things I don't understand." Similarly, Student 11 shared in the interview, "When I did not fully understand something, I would always refer back to my learning log and decide which topics to study more than others." These quotes demonstrate the experiences with learning logs that lead to students' self-ratings of metacognitive SRL skills changing overtime.

Additionally, a Wilcoxon Signed-Rank Test indicated statistically significant changes in median self-ratings from week two to week ten log entries in both implementations of action plans (Median W2 = 2.0, Median W10 = 4.0) and evaluation

of learning progress (Median W2 = 3.0, Median W10 = 5.0). Similarly, in studies implementing the Self-regulation Empowerment Program by Cleary et al. (2017), and by Zimmerman et al. (2015), SRL coaching that required goal setting supported a person's ability to achieve goals. Moreover, Chorng et al. (2019) used weekly digital reflection prompts for SRL over a 10 week period. As with this study, week 10 self-ratings of planning showed the greatest increase compared to week two. These studies emphasized the importance of goal setting in the SRL process to achieve positive learning outcomes. In this study, action planning and learning goal progress had similar, more rapidly increasing trend lines, finishing as the top (learning goal progress) and second (action planning) overall highest average scores. Students described goal setting with digital learning logs as, "I use it as a starting point to help work at doing what I need to reach my goals" (Student 14, interview), and "It [the learning log] impacts me during class because I know I set certain standards for myself in the class" (Student 5, week 3). Week after week, students set goals, made plans, and used the learning logs as a prompt to achieve their plans. Combining these results with prior research demonstrates the importance and outcomes of implementing planning within digital learning logs to enhance student performance.

This study joined prior research to indicate how SRL strategy supports can positively impact metacognitive SRL. The structure of the digital learning logs used in this study mirrors supports used in prior studies; embedding focused goal setting at the start of the lesson (Green et al., 2015), and reflection prompts after the lesson (Deekens et al., 2018). All these supports seek to align to the SRL cycle of forethought, performance control, and reflection (Zimmerman, 2011). As with this study, Green et al. (2015) had

students in high school history and science classes analyze learning tasks to develop and prioritize sub-goals, and create a time management plan. The researchers also provided an interactive PowerPoint about SRL strategies. From that intervention, the researchers reported an increase in students' ability to plan for and identify information useful to their learning. Deekens et al. (2018) used a think aloud protocol repeatedly to analyze student use of SRL strategies in science and social studies. By generating responses to the SRL think aloud prompts, students were required to consider and express choices made during the lesson. In this way, the prompt served as an intervention to increase metacognitive SRL and improve academic performance. In this study, reflections were used as a less invasive tool to prompt thinking about learning choices. While this study did not monitor academic performance like Deekens et al. (2018), it did find students indicated a growth in planning and an emphasis on learning. All this evidence suggested using strategies like goal setting and reflection promoted increased thinking about the learning session and improvement in students' metacognitive SRL skills.

Situating the findings and strategy supports from prior studies seeking to impact student SRL growth to this study anchors my selection of participants not prone to naturally high SRL. The AVID program, from which the participating class in the study is enrolled, provides a national model for participant selection. To be selected, students should demonstrate academic achievement in the 25th to 75th percentile and be on track to be a first-generation college student or from an underrepresented college population. Given that it is not intended for the highest achieving students to be in the AVID program, participants of this study fit the profile of students that most need to develop SRL skills as a foundation for college academics. By improving the skills, as evidenced

in this research, students corroborated the concept that metacognitive SRL skills can be developed through support structures, like digital learning logs. Developing SRL skills is an asset for AVID students because they will be most successful as future college students if they obtain the ability to self-support as autonomous learners (Papamitsiou & Economides, 2019).

Also aligning to initially infrequent use of SRL skills are findings from previous studies emphasizing that without metacognitive awareness as a part of technology-rich curriculum, student device use can be more of a distraction than a support (Kulesza et al., 2011; Perry & Steck, 2015; Sahin et al., 2016). Structured diaries, used in this study as learning logs provided students an opportunity to share self-ratings and reflections about task choices, focus, and metacognition, without invading learning performance during the lesson (Panadero et al., 2016). Two self-rating categories within learning logs (i.e., action plan use and evaluation of learning progress), provided analysis information aligned to metacognitive SRL skills. Similar interventions focused on targeting metacognition for SRL phases found improvement in overall ratings of SRL (Callan & Cleary, 2019; Cleary et al., 2017; Fabriz et al., 2014). The skills referenced in their studies, like planning, goal setting, outcome expectations, self and task questioning, organization, and self-evaluation, were key categories aligned to emergent themes and quantitative scales used in this research. Through this intervention, supports for metacognitive SRL development were found to be effective, particularly in a low student-to-computer environment.

Use of metacognitive SRL skills. Learning logs provided students an opportunity to share reflections about task choices, focus, and metacognition. Through inductive analysis, a primary theme of "Digital Learning Logs Supported Student Learning by

Emphasizing Learning" emerged related to metacognitive SRL. Categories (e.g., *self-evaluation, goal attainment,* and *seeking help*) from that theme aligned with metacognitive SRL skills highlighted in prior studies (Efklides et al., 2018; Pintrich et al., 1991; Schunk & DiBenedetto, 2020). While learning focus was not originally an expected outcome of this study due to the primary focus on task-related device use, students' expressions that emphasized learning arose, aligning to prior studies demonstrating an increase in academic achievement after SRL skill development (Greene et al., 2018; Kitsantas et al., 2018; Moos & Stewart, 2018). Student learning log and interview quotes demonstrate how students presented their metacognitive SRL skills as a result of using digital learning logs.

Throughout this study, student self-ratings of planning and learning progress increased. Self-monitoring is a performance control strategy used by students to bridge from planning to task achievement (Zimmerman, 2002). Common to findings from de Palo et al. (2017), who reported students demonstrating stronger use of SRL skills procrastinated less, students in this study used self-monitoring to sustain focus and support the achievement of goals. Student 8, week three, described the use of the learning logs for goal attainment as, "I know what I am going to do that day through my learning log, and it helps me get prepared to ask questions on things I don't understand, or I can also help others if they don't know what they are doing." Similarly, Student 3 shared in the last week of the study via the learning log, "Today was a great day for me because I achieved my learning goal and action plan for today." Overall in this study, there were 41 instances where students described self-monitoring for learning. Self-monitoring learning

demonstrates an awareness of learning progress, showcasing growth in this key component of metacognition.

By experiencing and documenting success, students experience positive trends in attitude toward their subject area and study habits (Kim & Bennekin, 2013; Kim & Keller, 2010), providing context to student growth in learning progress. Even as early as week two, Student 11 noted, “I decide which topics to study more than others.” In week six, Student 6 shared, “I have noticed that I have been more on top of things and have studied more.” Similarly, Student 8 used the week four log to determine what particular study skills needed work, “Now that we have gone over it I see all my mistakes, but some of the questions I got wrong I could have got right if I would have taken my time.” In all, there were ten instances where students explicitly noted changes to their learning behaviors, indicative of increased metacognition for learning. While many elements of this study highlighted the growth in learners, specific references to changes that supported learning are positive outcomes for the once digitally distracted.

Through these log entries, students demonstrated how SRL strategy support affected their metacognitive SRL skills. Metacognitive SRL skills showcased in learning log reflections included self-evaluation, goal orientation, self and task questioning, and self-monitoring. Students referenced the use of metacognitive SRL skills to show an emphasis on learning while using digital learning logs for supporting task-related device use.

Conclusion. Foundationally, improvement of learning behaviors is a primary goal for SRL (White & DiBenedetto, 2018; Zimmerman, 1989). The combination of the quantitative and qualitative results presented in this discussion provides alignment to

each other, demonstrating growth in metacognitive SRL skills. Overall, these results align with prior studies that metacognitive SRL can improve through SRL strategy instruction and support (Chen et al., 2018; Cleary et al., 2017; Cleary & Zimmerman, 2004). In this study, the degree to which SRL strategy support affects metacognitive SRL skills is positive and significant. Learners demonstrated growth overtime on the MSRS and in self-ratings of planning and learning progress.

Student qualitative data provided insight into how digital learning log use supported metacognitive SRL skills, by emerging into themes specific to emphasizing learning and management of tasks, demonstrating awareness of thinking and its relationship to learning. Through log and interview responses, students demonstrated an ability to describe the use of metacognitive SRL skills that lead to growth in self-ratings, such as an emphasis on task management through planning and goal setting, and a focus on learning through self-questioning and self-evaluation. In conclusion, the multiple data points showcase using digital learning logs as an effective support for SRL by increasing student metacognitive SRL skills.

Research Question 2: How and to what degree does SRL strategy support affect performance control?

Performance control is a phase of the SRL cycle when students monitor and direct their learning toward completing a task (Cleary et al., 2012). Self-control and self-observation are the primary processes used to support performance control (Cleary & Zimmerman, 2004). Prior studies have noted training for the individual development of self-monitoring and self-control to be critical to the development of autonomous learners (Corno, 2001; Hoyle & Dent, 2018). Successful autonomous learning is particularly

essential in technology-rich learning environments that have broad access to connectivity, as well as active learning environments with choice, due to students having increased opportunities to waiver in commitments (Pennypacker-Hill, 2013; Schunk, 2001; Sletten, 2017). As a result of this study, answers to question two are presented as (a) increased self-rating of performance control skills, and (b) use of performance control skills, and (c) conclusion.

Increased self-rating of performance control skills. Effort regulation and time and environment management strategies provided support for the performance control phase within the SRL cycle. Pintrich et al. (1991) classified effort regulation and time and environment management as a learning strategy to enhance resource management during performance. Previous studies have gauged resource management elements of SRL to enhance performance, particularly in digital learning environments (Peck et al., 2018; Poot et al., 2018). For instance, Peck et al. (2018) analyzed the learning strategies utilized for perseverance to support successful course completion by university students who had previously dropped a course. Student self-ratings on the MSLQ instrument indicated effort regulation and time and environment management as the strategies most strongly implemented (Peck et al., 2018). Additionally, in this study students generated their own learning plans. In a study by Poot et al. (2018), students generated their own learning targets and questions. Students who participated in the autonomy promoting intervention demonstrated significant increase in the constructs of metacognitive SRL, time and environment management, effort regulation, and help seeking. In this study, effort regulation and time and environment management growth from pretest to posttest, as well as improvements to log entry self-ratings over time, determined the degree of impact

digital learning logs had on SRL skill support, particularly in the area of performance control.

Effort regulation, also known as volition, is a domain of SRL specific to performance control (Boekaerts & Corno, 2005). Effort regulation is the "tendency to maintain focus and effort toward goals despite potential distractions" (Corno, 1994, p. 229). Particularly, targeting effort regulation works to improve self-control and self-observation processes for performance control (Cleary & Zimmerman, 2004; Cleary et al., 2017; Corno, 2001; Kim & Bennekin, 2016). In this study, student perceptions of effort regulation increased significantly, demonstrated by the highest pretest (M = 4.62, SD = 1.82) and posttest (M = 6.31, SD = 0.66) scores. Students provided context for their growth by sharing the following realizations to support effort for tasks, "Having multiple things to do on it at once and being overwhelmed and [I have] to take a step back before diving back in" (Student 1, week 5), and "It helps guide you through times when you have a lot of work, and you don't feel like you can do it by helping keep you in line and focused on the task at hand" (Student 14, interview). Students showed significant growth in effort regulation after using digital learning logs.

Prior studies requested research on time and environment management skill support in technology-rich learning environments (Deimann, & Keller, 2006; Tagsold, 2013). Results from the implementation of the intervention in this study indicate time and environment management skills were significantly and positively impacted, demonstrated by the second highest pretest (M = 4.24, SD = 1.19) and posttest (M = 6.22, SD = 0.55) scores. Similarly, Cleary et al. (2015) found the time and environment management to be the most significantly impacted after implementation of reflection prompts. The

microanalysis results from reflection prompt responses corroborated MSLQ findings in that study. Additionally, Papamitsiou and Economides (2019) found time management and goal setting outcomes to be most significantly correlated to performance control in the form of successful autonomous learning in a virtual learning environment.

Students in this study described their growth in time management as, “I tend to get more important work done because it is all laid out; that way, I know what I need to do” (Student 12, interview), and focus on productivity as “I also write the efficiency of how I worked that day” (Student 3, interview). Overall, the study conducted in this research aligned with the findings of prior studies demonstrating the positive effect of SRL strategy supports on students’ perceptions of their time and environment management skills. With increased options for time use in digital learning environments, digital learning logs provide impactful support for time management.

Similarly, a Wilcoxon Signed-Rank Test indicated statistically significant changes in median self-ratings from week two to week ten log entries in both effort regulation (Median W2 = 3.0, Median W10 = 4.0) and time management
(Median W2 = 3.0, Median W10 = 4.0). Effort regulation and time management had the most similar trend lines across all ten log entries (See Figure 4.2), beginning and ending within a half of a point from each other. In this way, findings from the study align with other research demonstrating strategies for self-control, including effort regulation (Boekaerts & Corno, 2005; Peck et al., 2018) and time management (Papamitsiou & Economides, 2019; Poot et al., 2018), support performance control for SRL. By using digital learning logs, students increased awareness of performance control strategies in the areas of time management and effort regulation. Through increased awareness,

students made regulation choices that impacted performance and resulted in increased self-ratings throughout the study. These quantitative results regarding the degree of impact aligned to students' descriptions of how implementation impacted performance control, provided in the next section, to support the triangulation of overall results.

Use of performance control skills. Similar to this research, training in volitional strategies for performance control has previously demonstrated increased SRL (Boekaerts & Corno, 2005; Kelaher-Young and Carver, 2013; Kim & Bennekin, 2016). Kelaher-Young and Carver (2013) provided students data profiles from MSLQ pretest results, followed by articles about SRL skills, and reflection prompts. Analysis of reflections over the length of the course showed improvement in learner practices. In this study, students used the learning log reflection section to provide insight into the performance control choices made during the lesson. Unlike the Kelaher-Young and Carver (2013) study, students in this study received feedback on their reflections as an additional support. Computer generated feedback and modeling was provided as a support for effort regulation in a study by Kim and Bennekin (2016). Students in the experimental group demonstrated increases in task outcomes and effort regulation. In this study, students demonstrated an increased in effort regulation, but task performance was not assessed for growth in achievement. However, learners did demonstrate an emphasis on learning through reflections and interview responses. Ultimately, students expressed their performance control skills so often it formed the theme of "Digital Learning Logs Supported Student Learning by Focusing on Task." By developing task focus, students in this research demonstrated the fundamental description of performance control,

defined in this research as a phase of the SRL cycle when students monitor and direct their learning toward completing a task (Cleary et al., 2012, p. 6).

Azevedo et al. (2018) and Pennypacker-Hill (2013) reported students can increase performance on tasks by self-monitoring for management of mindset. Similar to using self-monitoring for learning, students referenced using the SRL skill of self-monitoring for task focus and productivity. Moreover, in this study, students evidenced self-monitoring for attention to support task achievement. For instance, student 8 stated in the week six log, “I am using it to track what I am doing and to make sure I don't get distracted in class.” In week five, Student 6 reflected, “I have to remind myself what I’m doing and focus on my work.” Students chose to use the log as a reminder, indicating it was a useful tool to have on hand as a support for focus. Through these reflections, students exemplified the learning log as a support tool to make positive choices for SRL.

Additionally, in this study, students noted monitoring a personal mindset. Efklides (2017) emphasized the critical role affect plays in metacognition and SRL, surmised from her findings analyzing the impact of affect and emotion on task performance. The study reported that SRL can fluctuate with emotions. The report of fluctuation is not surprising given the natural connection between emotions and motivation, and motivation being a key component of SRL (Paris & Paris, 2001). While motivation was not a primary construct investigated in this research, its inclusion in findings was not surprising. *Positive influence on affect* emerged as a category aligned to the “Digital Learning Logs Supported Student Learning by Managing Tasks” theme. For instance, student 13, starting in week five, “I need to work hard, make sure all my work is turned in on time, always have a great mindset, and always have a positive attitude.” Specific work skills

needing improvement were also shared, including “needing to work on getting started” (Student 5, week 3) and “I know I have to pay more attention and ask questions” (Student 8, interview). Furthermore, when students did not achieve the level of performance control needed to be successful, self-consequence, a SRL strategy, was used. These consequences included mandating extra help outside of class and additional practice for support. In all, students represented an increased awareness of their affect toward focus and adjustments that were needed for it to improve. In this way, student descriptions aligned to other research demonstrating the role affectual control plays in successful performance control. Additionally, student reports showcased how learning logs prompted reflection and goal setting to make improvements so that performance control could be further enhanced.

Through these log entries, students expressed the use of performance control strategies, including progress monitoring, self-evaluation, and self-consequence, forming the qualitative theme of focusing on a task. By providing structure and support within lessons for SRL, student reflections in learning logs aligned to prior studies reporting an increase in motivation for task focus and student performance (Cleary et al., 2018; Efklides et al., 2018). Overall, students demonstrated the use of the learning logs supported performance control by centering awareness and developing positive task focus.

Conclusion. Students focusing on tasks was the primary desired outcome of this study. This goal was desired based on needed support to mitigate student distraction in technology-rich, highly connected learning environments (Aagaard, 2015; Kulesza et al., 2011; Sahin et al.; Tagsold, 2013). It was hoped that similar to prior research, enhancing

SRL skills would develop and optimize students' abilities to demonstrate self-control and support goal attainment (Pellas, 2014; Paris & Paris, 2001; Zimmerman, 2011).

The findings presented in this study represent an impact on performance control and corroborated prior studies on volition control in digital learning environments (Kim & Bennekin, 2016; Kim & Keller, 2010; Peck et al., 2018). The combination of the results, situated in and aligned to prior studies, demonstrated growth in students' performance control skills through research-based strategies for resource management, including effort, time, and mindset. The degree to which SRL strategy support affects effort regulation and time management was positive and significant in both dependent *t*-tests and Wilcoxon Signed-Rank Tests of effort regulation and time management.

Similarly, student qualitative data provided insight into how digital learning log use supported effort regulation and time management by including progress monitoring, self-evaluation, and self-consequence, forming the qualitative theme "Digital Learning Logs Supported Student Learning by Focusing on Task," a hallmark of performance control. In all, these qualitative expressions represented the thoughts and actions of students that lead to growth in self-ratings within this domain. In conclusion, through the alignment of both quantitative and qualitative results of this study, students demonstrated using digital learning logs positively and significantly impacted the use of SRL strategies to enhance overall performance control.

Research Question 3: How do students describe the impact of SRL strategy support on their task-related device use?

So far, research questions have focused on the impact of the innovation on elements of SRL. Those elements tied to educational technology by using SRL skills,

particularly performance control, to mitigate expressed concerns over distraction increasing with growing device use in classrooms (Andersson et al., 2014; Durak, 2018; Perry & Steck, 2015). Research question three, however, focuses on students describing the impact that the innovation had on task-related device use. Qualitative, descriptive data from student learning log entries and interviews provided insight into student choices and changes. Overall, student changes are described through (a) technology usage, (b) behaviors when using devices, and (c) conclusion.

Technology usage. Awareness of a need for task management can motivate students to seek opportunities to increase the effective use of technology for task achievement (Greene et al., 2015; Moos, 2018). Students in this study reported changing technology usage to support task management through organizational adjustments. For instance, Student 4 stated in week 6, "I always had so many tabs open in a random order, so I decided to make four different sections so it would be more organized and so I would know where everything is." Student 3 shared in the interview, "As long as my assignments are also on my Chromebook, I like being able to go back and forth between my assignment and my log." Organization is a metacognitive SRL skill used by students in all stages of task achievement (Efklides et al., 2018; White & DiBenedetto, 2018). In this study, students referencing external organization with technology showcased the implementation of SRL skills to support device use. While technology use can provide a platform for increased distraction, in this instance, it offered an opportunity to learn organizational skills that benefited task-focused device use.

Additionally, students adjusted the usage of technology to support focus. Interestingly, most of the adjustments referenced involved students opting to discontinue

the use of their devices. Such as Student 4 in the week three log, who wrote, “To get done with my work, I stopped playing games, and I shut it off and did the rest of my work.” Similarly, Student 12 noted in the interview, “Sometimes when I log in to my learning log, it causes me to use my Chromebook for things other than assignments.” This student followed up sharing subsequent choices made to support achievement, “I think I work better on paper than on the Chromebook, so usually if there is a way for me to do the work on paper I do.” While unexpected that students would favor discontinuing device use, it did evidence their growth in effort regulation. Through effort regulation, a key performance control strategy, students make choices that protect goal attainment (Boekaerts & Corno, 2005; Pellas, 2014). While not anticipated, students chose to protect their goal of accomplishing assigned tasks by creating self-imposed limits on technology use. Once again, students demonstrated prioritizing the task over device use preferences showing a high level of performance control while using digital learning logs.

Behaviors when using devices. Improving behaviors when using devices was an intended outcome for this study. SRL supports implemented reflected the relationship between performance control and directing behaviors that occur during task completion (Zimmerman, 2002). Making choices for change to enhance goal attainment most represents social cognitivist theory, as students demonstrate becoming intentional actors in their development (Bandura, 1986). Similarly, in prior studies, student training to use short cycle goal-setting indicated making adjustments to actions and methods improved performance (Miller & Bernacki, 2019; Wilson & Narayan, 2016; Zimmerman et al., 2015). In this study, students explained the impact of digital learning logs on device use by describing changes to task focus and learning behaviors.

Primarily, students reported the log was a prompt for adjusting behaviors to increase task focus. For instance, Student 4 described in a week 2 log entry how the innovation supported staying focused while on the device, “When I'm on my Chromebook sometimes I want to work on things for other classes, and I remember what my goals were so I decide to keep on working on that instead.” Student 12 showcased how the log increased time on task by stating in the interview, “Let’s say I put on my learning log that I wanted to finish watching a video by the next day, when I have a spare minute in class I could watch some to get closer to finishing it, instead of not doing anything.” Student 13 shared how the innovation provided direct support, “I feel like my own pre-existing problems involving time-management are the real problem getting in the way of me managing my tasks, but when I use the learning log, it helps.” In these examples, as well as descriptions provided in theme analysis, students bring to life prior SRL research (e.g., Poitras & Lajoie, 2018; Shyr & Chen, 2017; Sletten, 2017), to demonstrate how strategy implementation can positively impact device use behaviors for task focus. The implementation of digital learning logs facilitating increased task focus strengthens time on task, mitigating teacher concerns about off-task device use, and supporting student achievement through increased attention to learning.

Additionally, students described using learning logs to impact learning behaviors when using devices. Prior studies focused on SRL found students receiving feedback and support for volition strategies had positive trends in attitude toward their subject area and study habits (Kim & Bennekin, 2013; Kim & Keller, 2010). In this study, students also expressed positive outcomes for learning behaviors. For instance, in week three, Student 11 stated, “This is making me do my notes and review.” Student 12 described how the

log supports self-evaluation and productivity, “Each time I fill out information, usually day by day, and fill in what I've done, what I complete, what I want to complete the next day, and I think about how I did on my work that day.” In an interview, Student 4 summarized the overall impact as, “It helps you manage your time and reminds you that if you need help with something, then to take advantage of the time available and seek that help you need.” These examples relay the voice from students using learning logs as support for SRL scaffolded learning in the one-to-one, Chromebook setting. As a scaffold, digital learning logs provided support for productive performance control, enhancing task achievement.

Conclusion. The reflection phase of SRL consistently, even in early studies, provides learners the opportunity to judge choices and personal effectiveness to determine needed changes that could improve outcomes (Cleary et al., 2012; Zimmerman, 2011; Zimmerman & Martinez-Pons, 1986). Overall, students described the use of digital learning logs as a support for management of, and focus on, tasks when using devices. Primarily students expressed feeling supported in these areas due to increased self-awareness prompted by log use. In some instances, discontinued device use took place during learning sessions where the device presented too much distraction for the student. Additionally, through the use of learning logs, learning behaviors were enhanced while using devices. In summary, the impact of SRL strategy support motivated students to make positive changes to technology use and behaviors when using digital devices for learning tasks.

Implications

This research has implications for me, classroom practitioners, as well as scholarly practitioners and researchers. Three types of implications were considered: (a) personal implications, (b) implications for classrooms with low student to computer ratios, and (c) implications for future research.

Personal Implications

As a result of this study, I have grown tremendously academically and as a researcher. Lessons I have learned include (a) enhanced knowledge of literature, (b), practical application of data collection and analysis, and (c) benefits of sharing and communicating findings.

Enhanced knowledge of literature. Academically, conducting the literature review provided me extensive knowledge about digital distraction and SRL. This research has been a complete path of discovery while seeking to support teacher concerns about technology integration in the classroom. I learned digital distraction is prevalent in technology-rich learning environments (Chou et al., 2012; Kulesza et al., 2011; Sahin et al., 2016). Digital distraction is only becoming more, and more of an issue as cellphone use among teenagers rises, and the focus of use tends to be leisure (Costa, 2017; Duncan et al., 2012).

Before conducting this study, I was not knowledgeable about SRL. I now know more about its theoretical grounding (Bandura, 1986; Piaget, 1954; Vygotsky, 1978), founding and related researchers (Boekaerts, 1996; Winne, 1995; Zimmerman, 1989), related measures (Cleary et al., 2012; Pintrich et al., 1991; Zimmerman & Martinez-Pons, 1986), as well as the evolution of numerous studies and measures on the topic from the

mid-1980s to 2020. Thirty-five years of literature review on such a broadly applicable topic was quite an undertaking. I became adept at navigating digital databases and library resources to access relevant materials, and mine for even more. There are so many additional avenues and studies I would like to learn more about, including the relationship to self-efficacy, task value, self-determination, and the broad world of motivation theories and research.

Practical application of data collection and analysis. Similar to having little knowledge about SRL, I had little knowledge of quantitative and qualitative data collection and analysis before this study. Prior degree programs had exposed me to these research domains, but I had never been required to use them authentically. I was able to experience the mixing, straining, sorting, and stewing that mixed methods research requires to triangulate quantitative and qualitative findings (Mertler, 2014; Creswell, 2014).

Overall, I learned a great deal about the intricacies of data collection and analysis. For instance, I learned the importance of quality interviews and follow up questions to produce useful data. Experiencing inductive analysis taught me the measures, digital tools, and coding processes necessary to develop thematic interpretations of findings. Before working on this study, I was not comfortable or familiar with the quantitative software and statistical understanding needed to be successful with analysis. Growth in this area included using a dependent paired *t*-test, a nonparametric Wilcoxon Signed-Rank Test, Bonferroni correction, and the purpose behind each. The limitations of conducting this research as such a novice will be described in a subsequent section.

From the data analysis, I was pleasantly surprised to find so much emphasis on learning as a result of implementation. While this corroborated other SRL studies, it was not the primary intent of my research. I was also concerned that as a result of increased SRL skills, some students chose not to use devices, but this leaves the potential for further study. Both these results showed me the richness and importance of inductive analysis to allow the data to show itself to the researcher, instead of the researcher requiring the data to fit the intended outcome.

Benefits of sharing and communicating findings. I was able to experience leadership and implementation of action research in my setting by coordinating with colleagues, students, and district officials. Working with them was a primary focus for member checking and sharing to ensure my results accurately reflected their experiences and could be used purposefully (Frels & Onwuegbuzie, 2013). From my peer review partner, I learned about how to critically analyze my work to communicate those experiences with the outside world effectively. Sharing my findings with students in the AVID program was a great experience to not only share with them the quantitative and qualitative results of their growth but also to demonstrate what schooling looks like at the doctoral level. It was a particular treasure to share this experience with the AVID students because almost all of them are bound to be first-generation college students, just as I was, and they got to be a part of the highest level of education.

Additionally, this experience has made me robustly more knowledgeable about SRL and its application in digitally rich learning environments. I can apply what I know in my setting by sharing the phases and strategies of SRL with those I work with when applicable. In my role supporting teachers for the development of our students, the

opportunity arises regularly. Learning logs are now voluntarily used in all AVID classes, as well as the math, science, and special education department. Teachers are providing students digital feedback and sharing successes in professional development with their peers.

Implications for Developing SRL in Classrooms with Low Student to Computer Ratios

Tying back to initial calls for education technology research seeking support for lack of student task focus in technology-rich learning environments (Terry et al., 2016), coupled with the need for strategies to increase metacognition to support learning (Perry & Steck, 2015; Sahin et al., 2016), this study provided positive findings for implementation of digital learning logs to support SRL strategy use mainly in the area of SRL skills for performance control. Implications for developing SRL in classrooms with low student to computer ratios include (a) supporting device use, (b) the importance of allowing authentic choice, and (c) importance of the phase cycling.

Supporting device use. Teachers that I know personally, as well as many studies cited in this research (e.g., Aagaard, 2015; Andersson et al., 2014; Wood et al., 2011), report high levels of off-task behavior when all or most students are working on digital devices. Instructionally, research suggests there is a sweet spot for cognitive load that can help mitigate the issue (Boekaerts, 2017; Seufert, 2018; Sweller & Paas, 2017). For instance, when a material is too easy or already mastered, students will quickly disengage and opt for personal selections available on individual devices (Aagaard, 2015; Deimann & Keller, 2006; Fried, 2008). Conversely, high cognitive load occurs when students are interacting with complex material or a hard to understand task structure when working on

a device, also resulting in making choices to move away from the assigned task (Aagaard, 2015; Stebner et al., 2019). However, finding the sweet spot for every student in every lesson is a great instructional goal, but one that takes honing instructional skills and solid content knowledge. Ultimately, all individuals cycle through forethought, performance control, and self-reflection phases to experience autonomy with learning (Usher & Schunk, 2018; Zimmerman, 2002). By honing in on and implementing SRL supports, such as digital learning logs, all students are met with phases of the SRL cycle to foster development, but are still rooted in goals they create for themselves.

Importance of allowing for authentic choices. Genuine opportunities to manage tasks and focus allow for student responsibility with self-direction in the performance control phase of SRL. It may seem counterintuitive to allow students who are experiencing difficulties with distraction increased choice to engage with whatever is holding their attention away from the task at hand. However, given the evidence of this research and prior studies (e.g., Cleary et al., 2018; Efklides et al., 2018), providing SRL support, as done here with learning logs, can develop students task focus authentically.

Students in this study chose to do extra practice, attend tutoring, turn off devices, stop talking, revisit notes, practice vocabulary, and more. Students received feedback on their logs but did not receive further instruction on those choices or what to write in the learning logs. Quantitative and qualitative results all indicated growth in SRL skills. Students who are developing their autonomy will need the ability to make choices to maximize the potential social cognitive effects from working through the phases of SRL (Kitsantas & Cleary, 2016; Schunk & DiBenedetto, 2020; Usher & Schunk, 2018). It is possible that active learning options provide students opportunities to implement SRL

more authentically, and can, therefore, progress more rapidly with SRL skill development.

Importance of phase cycling. While this research focused on outcomes for performance control, seeking increased task focus, students in this research regularly referenced the goals set in their learning logs as primary support for task success. Goal setting occurred during the action planning phase, and reflection provided an opportunity for self-assessment. As discussed, student self-ratings of action planning and learning goal progress had the most significant improvement and growth throughout the innovation (see Figure 4.2). Zimmerman (1989, 2001) developed the initial SRL cyclical model (i.e., forethought, performance control, reflection) used in this research. His most recent study (2011) emphasizes frequent goal setting as a critical element to developing self-regulated learners.

This study supports the report of Zimmerman (2011) and demonstrates how goal setting and the SRL cycle can be supported by using digital learning logs. Although task focus through performance control is an outcome, all phases of the SRL cycle must be routinely incorporated to support that outcome. In this research, action planning achieved an average self-rating over 4.0 mid-way through the study. However, all other elements did not reach that point until the last week of the study (see Figure 4.2). Essentially, setting goals once, or just reviewing strategies for performance control, will not achieve the same effect. SRL development is a cyclical process that takes time and work in all three phases.

Implications for Future Research

Conducting this study offered an opportunity for reflection on potential extensions or adjustments to learning more about the implementation of SRL strategy support and digital performance control. Recommendations for future research include:

- Prior research on feedback supported the inclusion of researcher feedback to the learning in this study (Dresel & Haugwitz, 2008; Green et al., 2015; Shyr & Chen, 2017; Wilson & Narayan, 2016). However, due to this study's focus on outcomes for performance control, an analysis of the feedback given was not conducted. In a direct replica of this study, more analysis of instructor feedback and student response could investigate changes to subsequent log entries.
- Schunk & DiBenedetto (2020) and Winne (2017), stated the next phase of research should focus on technology that promotes SRL through the use of learner data. Student self-ratings, strategy use checklists, and electronic grade books could pull data to create and automatically update personal SRL profiles. It would be possible to extend this research by incorporating longitudinal tracking in the format of such a profile, as well as using the profile for self-assessment of growth in the reflection phase of the SRL cycle.
- Conducting this action research study in a class taught by someone other than the researcher was necessary due to my position in the school as an administrator. Having an additional teacher involved provided an opportunity to bring in the perspective and effect of the participating classroom teacher. Teacher-created lesson plans determine student classroom experiences, but these were not analyzed. Understanding that autonomy is central to developing SRL (DeVore et

al., 2017; Flunger et al., 2019; Usher & Schunk, 2018), evaluating the effects of digital learning logs across various types of classroom instruction would provide more guidance on pedagogy strategies to support student training for SRL. Additional teacher voice in the form of teacher logs for regularly reflecting on student performance, as well as interviews, could provide other data for triangulation to findings of student SRL skill development.

- Visual cueing research for SRL has been enhanced through eye-movement tracking to support SRL strategy prompts and enhance learning and task focus (Jamet, 2016; Wang & Adesope, 2016). In this research, students referenced the importance of personally written goals and planning to prompt task focus. Future research that combines individually written action plans with advanced technology that monitors shifts in focus could find even more rapid growth in student SRL and achievement in digital learning environments.
- Additionally, organizational tools are available on devices to support student executive learning needs (Leary et al., 2016). For classroom practice that does not have access to advanced technology, like eye-movement tracking, it would be interesting to explore if screen masking tools (e.g., Read&Write extension, ScreenRuler) could be coupled with sticky note applications (e.g., Sticky Note, Post-it) to prompt goals and filter distraction simultaneously.
- Finally, I was concerned that as a result of increased SRL skills, some students chose not to use devices, but this leaves the potential for further study. Recalling that the National Education Association (2013) and South Carolina Education Oversight Committee (2015) call for students to become self-directed learners that

can adapt to digital development, discontinuing device use is not an adaptation. More investigation is needed into supports for students navigating the overwhelming effects of robust connectivity in the classroom.

Limitations

As with all research, there are limitations particular to the method and context. Using action research emphasized my setting and application in practice (Mertler, 2017; Mills, 2011; O'Gorman & MacIntosh, 2015). A small sample size (n = 14) only represented one class of AVID students in one grade level, not an entire student population of a grade level, school, or district. Seeking to impact this group of students as participants, the use of a control group did not occur (Metz & Page, 2002; Reeves & Oh, 2017). Due to the use of this method, only implications for this study can be shared. The data from the study cannot determine causation or make generalizations (Johnson, 2005; Manfra & Bullock, 2014). Readers of this research can review the methods and findings presented to gather ideas for their practice, but little more.

Beyond the limitations of the methodology, the measures used also presented limitations to the study. The measures used, including the MSLQ (Pintrich et al., 1991), interview protocol (Zimmerman & Martinez-Pons, 1986), and structured diaries (Schmitz & Wiese, 2006; Stoeger & Ziegler, 2008), were based on prior studies. However, they had to be adapted to fit the content of this research. Additionally, seven items within the MSLQ subscales used in this study were reverse coded. For some students, this presented difficulty with answering questions. Some students had questions about what the questions meant when they were completing the items. I am unsure if students accurately represented themselves or just put numbers they thought would be considered positive.

While using learning logs, fluctuations in attendance impacted the data source. Two students had absences during critical data week of week two and week 10. Removing those students' results further shrank the participant pool, resulting in the need to switch from a dependent *t*-test to a nonparametric test. For this research, that did not have any effect on the overall impact of the innovation.

Additionally, being a developing researcher, I found the statements provided from the participants only scratched the surface of the depths of choices and processes students used. Using the microanalytic protocol could have been useful to gain more details during the students' work sessions (Cleary et al., 2012; DiBenedetto & Zimmerman, 2013). However, if conducting this study in the future, the use of better quality questions and more quality follow up questions would be helpful. I placed too much emphasis on matching the items I used to those from a prior SRL interview protocol (Zimmerman & Martinez-Pons, 1986). While questions based in a scholarly study are a good starting point, I must put faith in questions I could generate myself to gather the data I needed.

Furthermore, my position in the school made the implementation of this research a challenge. Initially, when designing methods, I was a classroom teacher. As the classroom teacher, I could control almost everything about the implementation of the innovation. However, now as a researcher working with a teacher, I had to trust that my instructions and expectations for implementation were followed on the days I was not present in the classroom. Overall, I think the teacher participant did her best to implement digital learning logs and providing time for students to use them. Yet, there is no way for me, as the researcher, to know and be able to document everything that occurred during the innovation.

The setting constraints limited options for innovation. This setting has basic Chromebooks with networked resource for each student to use, including Google Apps for Education. I sought to only work with what is available to every student and teacher in my school. Some studies have computer-generated prompts that occur during the learner's work session to support SRL skills (Deekens et al., 2018; Edens, 2009; Kim & Bennekin, 2016; Shyr & Chen, 2017). In the context of this study, students had to rely solely on themselves to prompt strategy use. Digital prompts could have potentially been useful for students in the study who found device use too distracting.

Finally, as an administrator at the school, my positionality is a limitation (Creswell, 2013; Mertens,2009). I worked to ensure all participants, including teachers, were assured participation was optional. I tried to limit my exposure in the classroom while learning logs were being completed, except for the introduction to and administration of the quantitative instruments. In this way, I tried to keep myself as an outside supporter providing feedback in their learning logs, but not being overly intrusive to their work. Even with all these supports, assurances, and distancing approaches, my staff and students know who I am and the role I play in their school. It is unlikely they were entirely uninfluenced by my role in this study.

Closing Thoughts

The purpose of this action research was to evaluate the impact of digital learning logs to support SRL for high school students of average achievement who have individual access to digital connectivity within the classroom. In summary, the use of digital learning logs embedded as a networked resource in participant Chromebooks provided training and support for performance control. As a part of this study, learners

demonstrated enhanced metacognitive SRL skills, performance control, and behavior changes. Responding to the grand tour question, SRL strategy support impacted student device use by increasing metacognition SRL skills to highlight performance control opportunities and prompting behavior and technology use changes to support learning.

In closing, student device use will continue to rise as access to digital textbooks, the internet, online courseware, productivity applications, and learning management platforms make doing school digitally, whether blended or fully online, a reality across the nation. At the state and local level, school systems express a desire to develop life-long learners ready for a digital age (South Carolina Education Oversight Committee, 2015). This study presented one innovation that supported students in one specific context. The overarching takeaway is that supports and strategies are available to help our students embrace a digital world while developing as learners. These do not have to be overly costly to money or time. They just need to be based on research and implemented by a reflective practitioner willing to guide, support, and adjust to achieve growth.

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APPENDIX A

SURVEY: SELF-REGULATED LEARNING SUBSCALES

Respond to the following prompts using a 7-point Likert scale ranging from 1 (not at all true of me) to 7 (very true of me).

The items representing the metacognitive SRL construct ($\alpha = .79$):

1. When working using my Chromebook, I often miss important points because I am thinking about other things (REVERSED)
2. When reading using my Chromebook, I make up questions to help focus my reading
3. When I become confused about something while working on my Chromebook, I go back and try to figure it out
4. If materials presented on my Chromebook are challenging to understand, I change the way I interact with the material
5. Before I work on new materials thoroughly using my Chromebook, I often skim it to see how it is organized
6. When working using my Chromebook, I ask myself questions to make sure I understand the material
7. I try to change the way I work and study using my Chromebook in order to fit the course requirements and instructor's teaching style
8. I often find that I have been reading using my Chromebook, but don't know what it was all about (REVERSED)
9. When working using my Chromebook, I try to think through a topic and decide what I am supposed to learn instead of just reading it over
10. When studying using my Chromebook, I try to determine which concepts I don't understand well
11. When I study using my Chromebook, I set goals for myself in order to direct my activities in each study session
12. If I get confused taking notes using my Chromebook, I make sure I sort it out afterward

The items representing the effort regulation construct ($\alpha = .69$):

1. I often feel so lazy or bored when working on the Chromebook that I quit before I finish what I planned to do (REVERSED)
2. I work hard when working on my Chromebook in order to do well in class, even if I don't like what we are doing

3. When it is difficult to work using my Chromebook, I give up or only doing the easy parts (REVERSED)
4. Even when working using my Chromebook in class is dull and uninteresting, I manage to keep working until I finish.

The items representing the time and environment management construct ($\alpha = .76$):

1. When using my Chromebook, I usually work in a place where I can concentrate
2. When using my Chromebook, I make good use of my time in class
3. When using my Chromebook, I find it hard to stick to a schedule I prepare for my work during class (REVERSED)
4. When using my Chromebook, I have a regular place set aside for working on materials for class
5. When using my Chromebook, I make sure I keep up with readings and assignments for class
6. When using my Chromebook, I often find that I don't spend very much time working on classwork because of other activities (REVERSED)
7. I attend class regularly
8. I rarely find time to review my notes or readings before a test (REVERSED)

Adapted from Pintrich et al. (1991)

APPENDIX B

STUDENT INTERVIEW QUESTIONS

Interviewer opening: Welcome, please have a seat. Before we begin, I wanted to let you know that this interview session is being recorded for research purposes for the study in which you are a participant. Before we start, please state your participant ID numbers.

Question 1: Tell me about how you used your digital learning log during economics?

Question 2: How did you use your learning log to plan and accomplish tasks in class?

Question 3: Please share an example or two for a situation where you made your plan for success in your log prior to starting work and the impact that had on your work.

Question 4: Give me an example or two about a time where using your learning log changed how you used your Chromebook in class.

Question 5: Describe a specific time when your learning log impacted your decisions during class?

Question 6: Please share with me an example or two for a situation or challenge you faced while working on your Chromebook and how you overcame that challenge by using a self-regulation strategy?

Question 7: Can you give me an example or two where you have used this type of learning log in other classes? Do you notice any changes in your work habits after using the logs? If so, please explain.

Question 8: Did you feel the learning log was useful for staying on task? Why or why not?

Question 9: Thank you, as our final question, is there anything else you would like to add or share that we have not talked about yet?

Interviewer closing: Thank you for your participation in this study and interview. I will now stop the recording.

Adapted from Zimmerman & Martinez-Pons (1986)

APPENDIX C

DIGITAL LEARNING LOG

Directions: Fill in the boxes when instructed by your teacher to document the date, learning goal, your action plan, self-assessment of what you did for that class block, and a reflection about your learning and SRL for the day. If you run out of rows for your daily log entries, insert a new row at the bottom.

Prompts for self-assessment section:

On a scale of 1(low) to 5(high), rate:

- How well you followed your action plan today
  - Remember your action plan is the steps you created at the beginning of the lesson to achieve your learning goal
- How often you considered your effort management
  - Remember effort management is about your commitment to complete study goals when faced with difficulties or distractions, such as continuing to work even if it is hard or there are distractions
- How often you consider your time and environment management
  - Remember time and environment management is about making the most effective use of time and setting to achieve goals, such as sticking to a schedule and choosing a seat for best focus
- How well you made progress toward your learning goal
  - Remember your learning goal is a statement you wrote at the beginning of the lesson about the learning progress you would make on an objective given by your teacher

Prompt for reflection section:

Reflect on the ratings you just gave yourself. What did you notice about your self-regulation today? What improvements do you want to make tomorrow? Why?

Date	Learning Goal	Action Plan	Self-Assessment (rate 1 to 5)	Reflection
			Action plan: Effort: Time: Learning goal:	

Adapted from Schmitz & Wiese (2006) and Stoeger & Ziegler (2008)

APPENDIX D

PARTICIPANT ASSENT FORM

Potential research participant,

I am writing to seek your agreement to participate in an action research project being conducted at [research site]. The research project is being conducted as a requirement for completing my Ed.D. in Educational Technology through the University of South Carolina.

The primary research question to be studied is: How and to what extent does self-regulated learning (SRL) strategy support affect student SRL in a one-to-one computer to student ratio environment? As a participant, you will be given an overview of SRL strategies to support your development. Then, digital learning logs will be used for goal setting, self-assessment, and planning for the next day. As the researcher, I will provide you feedback directly in your digital learning logs via Google Sheet comments. A quantitative analysis of your pre- and post-intervention SRL will be conducted using a validated and reliable scale known as the Metacognitive SRL Questionnaire. Additionally, student interviews will be used to provide qualitative descriptions of the impacts of the intervention. Please be assured all personal information will be kept confidential. Student names will not appear on any documents once they are removed from the classroom setting.

This will take place during your normal AVID course, as it naturally aligns with the AVID curriculum. [Teachers] have agreed to partner with me during the Spring 2019 term. A parent letter will be sent home to inform your parents or guardians about the study. Parents or guardians can return the letter to indicate they would not like you to participate. Also, you have the option of opting out of participation in this study. You may opt-out at any time prior to this research being submitted for defense in order to have your data removed from the study. Choosing to opt-out of this study will not affect your participation in AVID or its partner class. There will be no academic reward or penalty for involvement or lack thereof. Since this is a part of a regular class, you do not have to do anything to indicate you will participate. Participation will conclude at the end of the Spring 2019 school year.

I will make a copy of my research findings available to you upon completion of the study.

Please feel free to contact me with any further questions.

Thank you,

Participation Assent Form - Opt-Out

As an AVID student at [research site] in the Spring 2019 term, I am returning this document to confirm that I do **NOT** want to be a participant in this action research study.

Student Name:
_____

Student Signature:
_____

Date:
_____

APPENDIX E

PARTICIPANT CONSENT FORM

To parent or guardian of the potential research participant,

I am writing to seek your agreement to participate in an action research project being conducted at [research site]. The research project is being conducted as a requirement for completing my Ed.D. in Educational Technology through the University of South Carolina.

The primary research question to be studied is: How and to what extent does self-regulated learning (SRL) strategy support affect student SRL in a one-to-one computer to student ratio environment? As a participant, your student will be given an overview of SRL strategies to support their development. Then, digital learning logs will be used for goal-setting, self-assessment, and planning for the next day. As the researcher, I will provide your student feedback directly in the digital learning logs via Google Sheet comments. A quantitative analysis of your student's pre- and post-intervention SRL will be conducted using a validated and reliable scale known as the Metacognitive SRL Questionnaire. Additionally, student interviews will be used to provide qualitative descriptions of the impacts of the intervention. Please be assured all personal information will be kept confidential. Student names will not appear on any documents once they are removed from the classroom setting.

This study will take place during the regularly scheduled AVID course, as it naturally aligns with the AVID curriculum. [Teachers] have agreed to partner with me during the Spring 2019 term. Your student has also received a letter to inform him or her about the study. Students can return the letter to indicate they would not like to participate. Also, you have the option of opting for your student out of participation in this study. You may opt-out at any time prior to this research being submitted for defense in order to have your data removed from the study. Simply return the attached form to opt-out. Choosing to opt-out of this study will not affect your student's participation in AVID or its partner class. There will be no academic reward or penalty for involvement or lack thereof. Since this is a part of a regular class, you do not have to do anything to indicate your student can participate. Participation will conclude at the end of the Spring 2019 school year.

I will make a copy of my research findings available to your student that can be shared with you upon completion of the study. Please feel free to contact me with any further questions.

Participation Consent Form - Opt-Out

As the parent or guardian of an AVID student at [research site] in the Spring 2019 term, I am returning this document to confirm that I do **NOT** want my student to be a participant in this action research study.

Student Name:
_____

Parent Name:
_____

Parent Signature:
_____

Date:
_____

APPENDIX F

SITE APPROVALS

District supervisor:

10/23/2018

Era Roberts

Mrs. Roberts,

Thank you for considering [redacted] for your research interests.

I want to inform you that your research proposal regarding the impact of the implementation of digital learning logs on student self-regulation in a one-to-one environment has been improved.

Prior to any interviews or questions forms, please send to me any questions you will be using. Also, please send me a copy of the consent forms you are planning to use. Additionally, what are the dates for which you will be performing the study?

Please let me know if you have any questions regarding this.

Sincerely,

Building supervisor:

[redacted] Thu, Oct 18, 2018 at 9:38 AM

Good morning,

I am writing to seek approval from my building supervisor in order to conduct research [redacted] arch project is being conducted as a requirement for completing my Ed.D. in Educational Technology through the University of South Carolina.

The research question to be studied is: How and to what extent does implementation of digital learning logs impact student self-regulation in a one-to-one computer to student ratio environment? Students will be given an overview of self-regulated learning and strategies to support that development. Then, digital learning logs will be used for students to goal set, self-assess, and plan for the next day. As the researcher, I will provide students feedback directly in their digital learning logs via Google Sheet comments. A quantitative analysis of their pre- and post- intervention self-regulation will be conducted using a validated and reliable scale known as the Metacognitive Self-regulated Learning Questionnaire. Additionally, classroom observations, student interviews, and teacher interviews will be used to provide qualitative descriptions of the impacts of the intervention.

This will take place during their normal AVID course, as it naturally aligns to the AVID curricul[redacted]eachers, have agreed to partner with me during the Spring 2019 term. A parent letter will be sent home to inform them of the study and with the use of passive consent, be provided the option of opting out. All students will be given assent forms for participation in the study. Those who do not wish to participate in the study will have their data removed from the research at any time prior to its submission for defense. There will be no academic reward or penalty for participation or lack there of. Please be assured all students personal information will be kept confidential. Their names will not appear on any documents once they are removed from the classroom setting.

I will make a copy of my research findings available to you upon completion of the study.

Please reply back to this email to with approval for this study, or any further questions.

Thank you,

Era Roberts

--

Era Roberts
Assistant Principal

[redacted] xperiences to

[redacted] u, Oct 18, 2018 at 10:09 AM

I certainly agree!
[Quoted text hidden]
--

Cooperating teacher - AVID:

[redacted] Thu, Oct 18, 2018 at 9:3

Good morning,

I am writing to seek approval from my cooperating teacher in order to conduct resea[redacted]research project is being conducted as a requirement for completing my Ed.D. in Educational Technology through the University of South Carolina.

The research question to be studied is: How and to what extent does implementation of digital learning logs impact student self-regulation in a one-to-one computer to student ratio environment? Students will be given an overview of self-regulated learning and strategies to support that development. Then, digital learning logs will be used for students to goal set, self-assess, and plan for the next day. As the researcher, I will provide students feedback directly in their digital learning logs via Google Sheet comments. A quantitative analysis of their pre- and post- intervention self-regulation will be conducted using a validate and reliable scale known as the Metacognitive Self-regulated Learning Questionnaire. Additionally, classroom observations, student interviews, and teacher interviews will be used to provide qualitative descriptions of the impacts of the intervention.

This will take place during their normal AVID course, as it naturally aligns to the AVID curriculum. I am seeking your agreement to partner with me during th Spring 2019 term. A parent letter will be sent home to inform them of the study and with the use of passive consent, be provided the option of opting out. All students will be given assent forms for participation in the study. Those who do not wish to participate in the study will have their data removed from the research at any time prior to its submission for defense. There will be no academic reward or penalty for participation or lack there of. Please be assured all students personal information will be kept confidential. Their names will not appear on any documents once they are removed from the classroom setting.

I will make a copy of my research findings available to you upon completion of the study.

Please reply back to this email to with approval for cooperation this study, or any further questions.

Thank you,

Era Roberts

--

[redacted]ing experiences to

[redacted] Thu, Oct 18, 2018 at 11:5

To: Era Roberts <eroberts@lex3.k12.sc.us>
Cc: Bob Roudybush <rroudybush@lex3.org>

Yes, I approve.
[Quoted text hidden]

Cooperating teacher - AVID content partner:

[redacted]

Thu, Oct 18, 2018 at 9:36 AM

Good morning,

I am writing to seek approval from my cooperating teacher in order to con[redacted]
High School. The research project is being conducted as a requirement for completing my Ed.D. in Educational Technology through the University of South Carolina.

The research question to be studied is: How and to what extent does implementation of digital learning logs impact student self-regulation in a one-to-one computer to student ratio environment? Students will be given an overview of self-regulated learning and strategies to support that development. Then, digital learning logs will be used for students to goal set, self-assess, and plan for the next day. As the researcher, I will provide students feedback directly in their digital learning logs via Google Sheet comments. A quantitative analysis of their pre- and post- intervention self-regulation will be conducted using a validated and reliable scale known as the Metacognitive Self-regulated Learning Questionnaire. Additionally, classroom observations, student interviews, and teacher interviews will be used to provide qualitative descriptions of the impacts of the intervention.

This will take place during their normal AVID course, as it naturally aligns to the AVID curriculum. I am seeking your agreement to partner with me during the Spring 2019 term. A parent letter will be sent home to inform them of the study and with the use of passive consent, be provided the option of opting out. All students will be given assent forms for participation in the study. Those who do not wish to participate in the study will have their data removed from the research at any time prior to its submission for defense. There will be no academic reward or penalty for participation or lack there of. Please be assured all students personal information will be kept confidential. Their names will not appear on any documents once they are removed from the classroom setting.

I will make a copy of my research findings available to you upon completion of the study.

Please reply back to this email to with approval for cooperation this study, or any further questions.

Thank you,

Era Roberts

--

Era Roberts
Assistant Principal

[redacted]

I Agree
[Quoted text hidden]

APPENDIX G

PRESENTATION FOR STUDENTS REGARDING RESEARCH

Task Focused in the Age of Distraction: High School AVID Students Use of Digital Learning Logs to Support Self-Regulation in a One-to-One Chromebook Setting

Era Roberts
Research Presentation for AVID Elective Students

Research Questions

How will self-regulation strategy support impact student device use?

The specific questions to explore are:

1. To what degree does self-regulation strategy support affect motivational self-regulation strategy use?
2. To what degree does self-regulation strategy support affect performance control?
3. How do students describe the impact of self-regulation strategy support on their task-related device use?

Innovation: Self-Regulation Strategy Support

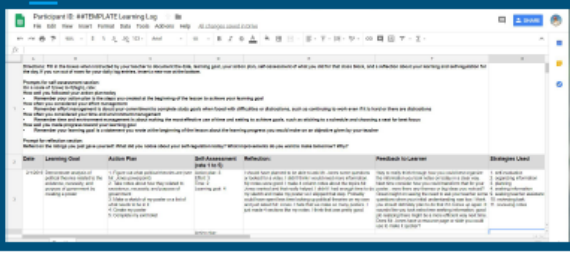
Basis

- Training and individual feedback cycle through the Self-Regulation Training Empowerment Program (Cleary & Zimmerman, 2004)
- Member check-in (Terry et al., 2016; Wills & Mason, 2014)
- Personal learner feedback (Kim & Bennekin, 2013; Kim & Keller, 2010)

Innovation

- Brief training on self-regulated learning
- Brief training on performance control strategies to facilitate self-regulation
- Student development through personal digital learning logs
- Individualized instructor feedback

Digital Learning Logs



Connecting the Dots

Self-Regulated Learning	Task Success	Digital Learning Log	MSLQ (81 items)	Additional Aligned Data
Forethought	Planning	• Goal setting • Action plan	Selection of cognitive learning strategies (not tested)	
Performance Control	Monitoring and adjusting	• Self-assessment of self and resource management	Self and resource management (24 items) • MSRS • Time and environment management • Effort regulation	Interviews
Reflection	Determining how task achievement fits into the larger whole, antecedent for self-adjustment and growth	• Reflection	Motivation (not tested)	Interviews

Data Collection

- Survey: Metacognitive Self-regulated Learning Questionnaire (MSLQ) subscales for self and resource management (Pintrich, Smith, Garcia, & McKeachie, 1991) (Appendix A)
  - Metacognitive self-regulation
  - Effort regulation
  - Time and environment management
- Interviews (Appendix B)
- Student digital learning log (Appendix C)

Rigor and Trustworthiness

- Triangulation
- Member checking
- Peer debriefing
- Audit trail

Plan for Sharing

- Student session during Half-Time
- District instructional leadership team
- Regional conferences
  - Lexington 3 Technology Conference
  - South Carolina Educational Technology Conference
  - Upstate Technology Conference
- Apply for national conferences
  - Association for Supervision and Curriculum Development
  - National AVID Conference

So, what is Self-Regulated Learning?

- High use of self-regulated learning is referred to as an "expert learner" (Bray & McCloskey, 2016)
- Self-regulated learning focuses on motivational and metacognitive awareness of processes that support one's learning (Paris & Paris, 2001; Zimmerman, 1989)
- This process occurs in a three-stage feedback loop of forethought, performance control, and reflection (Zimmerman, 2002)
- Essentially, it means you can successfully direct your own learning (White & DiBenedetto, 2018)
- There are research based strategies known to be used by highly self-regulated learners

What are strategies to support self-regulated learning?

Organizing and transforming

Ex: Response to task or goal analysis to chunk, regroup, section, separate, or other organizational method to support attainment, adjusting methods that are not working, organizing to align to a rubric or set expectation

Goal-setting and planning

Ex: Goal is generated and written, multi-step plan to achieve goal is formally set/written

What are strategies to support self-regulated learning?

Seeking information

Ex: Taking initiative for goal attainment through collection of needed information to support learning, such as articles, readings, websites, videos, presentations, lecture casts, mini lessons, or teacher interviews

Commitment to goal

Ex: Expressing desire overcome distraction or disinterest by using strategies or structuring so the goal can be obtained

What are strategies to support self-regulated learning?

Reviewing task, notes, or other materials

Ex: Managing available resources through review such a highlighting, summarizing, indicating main ideas or generating explanations to support learning goal

Self-consequences

Ex: Mentions or writes about planning for receiving rewards or punishments imposed by self, such as completing five items by a certain time means taking a 2 minute break, or not attaining a goal results in loss of a favor such as candy or lunch time

What are strategies to support self-regulated learning?

Environmental structuring

Ex: Expressing choices to minimize distractions such as seating choice, location of technology, noise level, or other intentional manipulation of environment to support goal or task attainment

Keeping records and self-monitoring

Ex: Interacting with the written plan, such as with a checklist, is used to monitor progress; mentions or writes about being aware of paying attention, maintaining or adjusting focus; checking progress

What are strategies to support self-regulated learning?

Seeking information

Ex: Taking initiative for goal attainment through collection of needed information to support learning, such as articles, readings, websites, videos, presentations, lecture casts, mini lessons, or teacher interviews

Self-evaluation

Ex: Evaluating one's readiness for goal or task attainment. Considering prior knowledge or experiences. Questioning self about the task or academics. Judging choices and personal effectiveness to determine needed changes that could improve outcomes.

Why would you want to use self-regulated learning strategies?

- Higher use of self-regulated learning strategies leads to greater engagement with learning processes (Pellas, 2014; Perry & Steck, 2015)
- Helps with navigating course work that is challenging or unstructured (Miller & Bernacki, 2019
- Use of self-regulated learning strategies has been found to be a predictor of standardized achievement test scores (Cleary et al, 2017)
- Self-regulated learning strategies can be used to increase your overall self-regulated learning skills
- Using forethought (planning) and reflection support improved performance control; focusing on performance control can lead to better academic outcomes

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APPENDIX H

INSTITUTION REVIEW BOARD NOTIFICATION

UNIVERSITY OF SOUTH CAROLINA

OFFICE OF RESEARCH COMPLIANCE

INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH
DECLARATION of NOT RESEARCH

Era Roberts
[redacted] USA

Re: **Pro00083922**

Dear Era Roberts:

This is to certify that research study entitled ***Task Focused in the Age of Distraction: High School AVID Students Use of Digital Learning Logs to Support Self-Regulation in a One-to-One Chromebook Setting*** was received on **11/7/2018** by the Office of Research Compliance, which is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). The Office of Research Compliance, on behalf of the Institutional Review Board, has determined that the referenced research study is not subject to the Protection of Human Subject Regulations in accordance with the Code of Federal Regulations 45 CFR 46 et. seq.

No further oversight by the USC IRB is required. However, the investigator should inform the Office of Research Compliance prior to making any substantive changes in the research methods, as this may alter the status of the project and require another review.

If you have questions, contact Lisa M. Johnson at lisaj@mailbox.sc.edu or (803) 777-6670.

Sincerely,

Lisa M. Johnson
ORC Assistant Director and IRB Manager