5-2021

Self-Regulated Learning in a Pandemic: Implementing the SEE Framework in an Online Teaching Environment

Haley Hand
Utah State University

SELF-REGULATED LEARNING IN A PANDEMIC: IMPLEMENTING THE SEE FRAMEWORK IN AN ONLINE TEACHING ENVIRONMENT

by

Haley Hand

Capstone submitted in partial fulfillment of the requirements for graduation with

University Honors

with a major in

Psychology

in the Department of Psychology

Approved:

Capstone Mentor	**Departmental Honors Advisor**
Dr. Greg Callan	Dr. Crissa Levin

University Honors Program Executive Director
Dr. Kristine Miller

UTAH STATE UNIVERSITY
Logan, UT

Spring 2021

Abstract

Self-regulated learning (SRL) is a cyclical process that motivates students and facilitates achievement in a variety of domains (Wang, 2013). It entails several processes, such as planning, setting goals, using learning strategies, self-monitoring, reflecting, and holding adaptive motivational beliefs. Moreover, SRL can be developed through interventions and classroom practices. However, there is a shortage of trained interventionists. Teachers can also use a variety of classroom practices to develop students' SRL skills. A framework of practices, known as the Settings, Events, and Exchanges (SEE) framework, was developed to organize these classroom practices for teachers (Callan et al., 2020).

The practices in this framework include (a) the creation of a setting that is conducive to SRL, (b) student-teacher exchanges that facilitate the development of SRL, and (c) events that allow students the chance to reflect on their learning. Specifically, teachers can foster effective learning settings by developing supportive student-teacher relationships, implementing routines and clear participation structures, providing collaborative learning opportunities, and encouraging the use of adaptive help-seeking strategies. Exchanges that support SRL include the use of explicit instructions, modeling, SRL feedback, prompts, and connections made between the use of SRL strategies and academic success. Finally, events that can facilitate SRL include multiple opportunities to succeed, long-term learning opportunities, tasks that are both at an appropriate challenge level as well as supportive of student autonomy, self-assessment, peer co-learning, and the use of SRL worksheets (Callan et al., 2020).

The SEE framework was developed to support SRL development in traditional, in person classrooms. In light of the fact that online learning elicits a greater need for SRL, the purpose of this presentation is to examine which SEE framework practices do and do not have empirical

support within online learning environments. Doing so provides practical support for teachers and identifies research gaps for researchers.

Acknowledgements

A special thank you to Dr. Greg Callan, my mentor throughout this project. His guidance, patience, and open mindedness were the only reasons that this project was able to be completed in such a short amount of time. Next, I would like to thank Dr. Crissa Levin, who guided me to people and resources that could help me when I had no clue how to move forward. Her encouragement and positivity were instrumental in helping me maintain the necessary motivation to keep going. In addition, I would like to thank the Honors Program (especially Dr. Kristine Miller) for supporting me throughout this process and answering all my questions. Finally, I would like to express my appreciation to my parents and my roommates for their love and moral support these past two semesters.

Self-Regulated Learning in a Pandemic: Implementing the SEE Framework in an Online Teaching Environment

In March of 2020, the COVID-19 pandemic altered many aspects of everyday life. One domain that was hit especially hard was education. In order to protect students and staff against infection, about 87% of the world's students were forced to transition to an online and/or blended learning environment (United Nations Educational, Scientific and Cultural Organization, 2020). This percentage was even higher in the United States, with 93% of households with students in K-12 reporting that their children were participating in some form of distance learning (McElrath, K., 2020). For many learners, it was their first time participating in online learning, which is inherently different from in-person learning. Specifically, online learning involves less direct supervision from the instructor. Instead, more responsibility is placed on the learner to advocate for their own learning (Hong, 2021), which requires students to possess more effective self-regulated learning (SRL) skills, such as setting goals, planning, using strategies, monitoring, and reflecting, which have been shown to support learning in online learning environments (Broadbent & Poon, 2015). Although some students possess the necessary SRL skills, many do not (Greene et al., 2015).

Fortunately, SRL is a skill that can be developed, and teachers can do so in many ways. One framework, known as the "SEE framework", identifies 17 practices that teachers can use within their classrooms to develop student SRL (Callan et al., 2020). Specifically, the SEE framework describes practices that educators can use to develop a setting conducive to SRL, describes exchanges between teachers and students that develop SRL, and events that can occur in the classroom to allow students to practice their SRL skills. A couple examples of practices

that teachers can implement from the framework include the establishment of routines (setting), providing students with constructive feedback (exchanges), and giving students opportunities to act autonomously (event). This framework was developed for face-to-face classroom settings and the empirical support for these practices were derived from research within face-to-face classes. Given the vast increased proportion of students participating in virtual classes, there is a need to examine the empirical support for the SEE framework within online learning environments. The purpose of this presentation is to examine the empirical support for SEE framework practices within online/blended learning environments. We address two research questions specifically: First, we examine, "Which practices have empirical support in online/blended learning environments? Second, we examine, "Which practices do not have support in online/blended learning environments?" In doing so, we will be able to inform teachers and college instructors of practices to support SRL within their online classrooms. In addition, we will inform researchers which practices would be worth taking a deeper look at.

Self-Regulated Learning Explained

Before delving into the research on the SEE Framework, it is first necessary to define SRL. In simplest terms, SRL is a set of processes that learners use to both monitor and manage their thoughts, feelings, and actions, in a manner that promotes efficient learning. A few common examples include behaviors such as goal-setting, planning, reflection, and the use of learning strategies (Bandura, 1986; Zimmerman, 2000). These processes, all of which have been vetted by substantial amounts of empirical evidence, are believed to operate in a cyclical pattern, which can cause synergistic advantages.

Though there are many models that illustrate the mechanics of SRL, our discussion will focus on Zimmerman's (2000) model. This model divides the process into three separate, yet corresponding phases: forethought, performance control, and self-reflection. In the first phase, forethought, the learner prepares to engage in a task, such as deliberate planning and goal-setting. Goal-setting involves envisioning the desired outcome of their actions (Callan et al., in review). By engaging in this practice, learners are able to have clearer expectations for themselves on what constitutes success and are able to better motivate themselves to complete their work (Yeh et al., 2019). Meanwhile, planning ahead entails deciding in advance what learning strategies to use and organizing one's resources in order to accomplish the task at hand (Callan et al., in review). It is imperative to plan ahead in order to consistently be successful with meeting goals (Yeh et al., 2019).

In addition to planning and goal-setting, motivational beliefs are critical before task-engagement because regulating one's learning requires a significant amount of effort that is unlikely unless one is motivated. Motivational beliefs can be broken down into four categories: self-efficacy, interest, task value, and outcome expectations. Self-efficacy entails one's belief about their capacity to successfully perform a specific task (Bandura, 1997). Meanwhile, interest articulates an individual's preference for performing that task (Fredricks & Eccles, 2002).

Task value is a complex facet of motivational beliefs, which essentially addresses whether one perceives a task to be important for their future. Task value can be broken down into an additional four components: attainment value (i.e., how important it is to perform a task well), intrinsic interest (i.e., how much the individual enjoys the task), utility value (i.e., how useful the task is at helping an individual attain their goals), and cost belief (i.e., perceptions revolving around the negative aspects of the task; Wang & Hong, 2018). Finally, outcome expectations are

similar to goals, in that they outline the learner's anticipated trajectory. They are especially important to consider, as they have a direct influence over the effort that students put forth towards their learning tasks (Marton & Säljö, 1976).

Adaptive planning, goal-setting, and motivational beliefs can positively influence the second phase of SRL, known as the performance control phase. As the name suggests, the performance control phase occurs when learners actually perform the learning task at hand. In order to optimize the learning process, regulated learners can engage in several learning strategies, including cognitive, metacognitive, behavioral, and environmental strategies. Cognitive strategies include steps taken to enable learning to occur or to manage the cognitive strain brought on by the task at hand (Cantrell et al., 2014). A few common cognitive strategies include rehearsal (i.e., continuously recalling information in an effort to memorize it), elaboration (i.e., connecting new facts to previously acquired understanding), and control strategies (i.e., the act of deciding which information is the most pertinent to the situation at hand and focusing on it; Callan et al., 2017; Wolters et al., 2003).

Meanwhile, metacognitive strategies involve evaluating one's own thought processes and becoming more self-aware of the level of understanding that has been attained (Desautel, 2009). These evaluations encourage the use of other behavioral strategies. Behavioral strategies involve actions that students take to manage behavior and engagement. Such strategies may include setting a specific amount of time for studying or using self-reinforcement once a certain amount of work has been accomplished (Callan, 2020; Wang & Wu, 2008). Finally, environmental strategies involve structuring a study environment that is conducive for learning (i.e., comfortable, minimal distractions, etc.; Du et al., 2015).

In addition to using strategies to support performance, learners also keep track of how well they are performing and their use of proper technique during the performance control phase. Regarding tracking one's performance, learners pay attention to their grades on assignments, their level of understanding of the course material, and, in some cases, how well they are doing in comparison to others in the class (Kostons et al., 2010). In addition, learners can monitor how well they are using proper technique. The use of strategies can be one type of technique learners can monitor. Regulated learners then use data gathered from self-monitoring to inform the next phase of SRL: self-reflection.

Self-reflection is the culmination of the previous two phases of SRL. During this phase, learners engage in a number of sub-processes that help them evaluate the effectiveness of their learning strategies (Zimmerman, 2000). These sub-processes include, but are not limited to, self-evaluation, causal attributions, and adaptive inferences. By identifying the reasons for their successes (and failures), learners are then able to modify their approach for future learning. Thus, SRL is a cyclical process, with one process leading to the next (Zimmerman, 2000).

The Importance of SRL

SRL is one of the most salient predictors of academic achievement across all academic disciplines (Dent & Koenka, 2016). Indeed, some past research indicates that SRL better predicts academic achievement compared to other important factors such has cognitive ability, socioeconomic status, personality, and gender (for some academic areas such as mathematics favoring males and reading favoring females; Callan et al., 2017; Caprara et al., 2011). SRL is a powerful predictor of achievement in a variety of domains. For example, SRL is able to predict achievement in reading (Thiede & de Bruin, 2018), mathematics (Cleary & Kitsantas, 2017), science (DiBenedetto & Zimmerman, 2013), writing (Graham & Harris, 2009), creative problem

solving (Rubenstein et al., 2018; 2020), athletic performances (Cleary et al., 2006), and musical performances (McPherson et al., 2019).

Though much of the research studying the role that SRL plays in academic achievement has been performed in the context of traditional classrooms, there is a substantial body of literature supporting the association between SRL and achievement in online environments as well. For example, Lehmann et al. (2014) found that SRL is especially critical for the academic success of online learners enrolled in classes that afford significant amounts of autonomy and have low instructor presence. Likewise, Uzun et al. (2013), found that using SRL strategies and having positive attitudes toward distance learning accounted for 15% of the variance in student achievement in an online college history class. Thus, it is critical for teachers to find ways for their students to develop SRL.

It is important to note that about SRL most effectively supports SRL when multiple SRL skills are integrated cohesively. For example, Barnard-Brak and colleagues (2010) examined the relationships among academic achievement in an online course and a variety of SRL profiles among American college students. They found minimal differences in GPA when comparing students who only endorsed forethought processes (i.e., goal-setting and environmental structuring). The same held true for students who were merely used performance/reflection-endorsing self-regulators. Meanwhile, students that utilized all parts of the SRL cycle achieved at the highest levels.

Developing SRL

Though not all students may be predisposed to using SRL skills automatically, it is possible to acquire them through intervention programs and by incorporating them within the general curriculum (Callan et al., 2020). Regarding interventions, there are two major

frameworks that are supported in the literature: Self-Regulated Strategy Development (SRSD; Graham & Harris, 2009) and Self-Regulation Empowerment Program (SREP; Cleary & Zimmerman, 2004). The extensive amount of research on SRSD shows that it can be a valuable tool for helping students succeed in multiple domains, including writing, mathematics, and reading (Cuenca-Carlino et al., 2016; Graham & Harris, 2009; Sanders et al., 2019). Likewise, it has been known to support students dealing with a variety of special needs and impairments, including SLD (Graham et al., 2012), ADHD (Johnson et al., 2012) and EBD (e.g., Graham et al., 2013). Perhaps most promising of all, results from meta-analyses bolster the strength of SRSD. For example, Graham et al. (2012) indicated that SRSD, with its effect size of 1.17, had the largest effect size of all the academic interventions considered within the meta-analysis (i.e., peer assistance; ES = 0.89; adult feedback; ES = 0.80; and creative imagery; ES = 0.70).

Though strategies are a central focus, SRSD also teaches students to set goals, make plans, monitor, and reflect adaptively. In doing so, SRSD promotes a cyclical feedback loop of SRL (Graham & Harris, 2009).

SRSD achieves this in six steps that can be used iteratively until students master the task at hand. During the first stage, instructors pinpoint skill deficits and features of successful task completion, then teach students prerequisite skills for strategy use. In stage two, we see the introduction of the strategy itself that will help lead to academic success. For instance, students learning how to write may learn the W-W-W What-2 How-2 strategy. This strategy teaches students to identify who the main character in their story is, when and where the story takes place, what the main character accomplishes, the behavior of the other characters, how the story ends, and how the characters feel. The third stage then involves modeling the use of the strategy through discussing the pros and cons of the strategy. During the fourth step, students commit the

strategy to memory and instructors coach students to use the strategy on their own. The responsibility for remembering to use the strategy is then gradually passed on to the student in the fifth step. To help students do this, teachers have them keep a record of their strategy use and lend their support when needed. By the time they reach the last step in the intervention, students are able to independently utilize the strategy and apply it in new situations.

Another prominent SRL intervention program is the Self-Regulation Empowerment Program (SREP). This intervention has gained initial support, but has received considerably less attention than SRSD. SREP is similar to SRSD, in that its goal is to encourage students to effectively use strategies to set goals, plan ahead, monitor progress, and reflect on task performance. However, there are some key differences between the two. For instance, SREP places greater emphasis on self-reflection. In addition to placing greater emphasis on self-reflection, SREP is unique in that its sessions are often guided by formative assessments, called SRL microanalysis.

Despite the fact that less research has been done on SREP in comparison to SRSD, the initial data is showing promising results. Cleary et al. (2008) measured the impact of an eleven-week long SREP intervention program used for 9th grade biology students in an urban high school. Specifically, they looked at whether this intervention helped students improve their test grades, use of SRL processes, and motivational beliefs regarding their ability to succeed in the biology class. Researchers collected self-reported data from the students, as well as teacher ratings, and found that students in the intervention group were able to significantly improve their use of SRL strategies, as well as their academic achievement. Cleary et al. (2017), a more recent study, investigated how successful SREP was when compared to an existing mathematics intervention. SRL microanalysis interviews noted that the SREP intervention group saw

significant improvements when compared to the control group. Specifically, the students in the SREP group showed a significant amount of improvement in their use of strategic planning, adaptive attributions, and adaptive inferences. Likewise, when it came to success in mathematics, the students in the SREP intervention group showed statistically significant levels of improvement compared to the control group.

Although intervention programs are available and have been shown to be effective. There are relatively few individuals trained to administer these interventions and students struggle to transfer SRL skills to new content areas independently. Thus, some researchers advocate for embedding SRL supports within existing classroom structures because this enables greater exposure to SRL supports and long-term help to learn how and when to deploy SRL skills.

Unfortunately, fostering SRL development can prove to be a difficult task, even in a traditional classroom. This could be due to several reasons, including a lack of knowledge of SRL, practices to support SRL, and maladaptive thoughts regarding SRL strategies (Callan et al., in review). Online classes have the added challenge of lacking the physical presence of the teacher during the learning process (Hong, 2021). Thus, it is unsurprising that many teachers do not feel capable enough to either execute interventions and/or embed some of the SRL practices in their classes. However, the SEE framework can help teachers to identify useful practices that they can incorporate into their classrooms to develop student SRL.

The SEE Framework

In an effort to help teachers overcome barriers associated with SRL teaching practices, it is imperative that teachers be provided with resources and training for how to utilize SRL within their classrooms. Callan et al. (2020) sought to help accomplish this goal by introducing teachers and practitioners to a framework known as the “SEE framework.” This framework is distinct

from SRL models that are developed to describe the sub-processes that comprise SRL. Instead, it takes things a step further and sets forth practices that teachers can implement in order to promote student SRL. Furthermore, the SEE framework is backed by empirical evidence and supportive examples that illustrate the connection between the identified practices and SRL skill development. In sum, it presents a structure that researchers can use to organize their results in a way that allows them to compare the effectiveness of common practices used to facilitate SRL development (Callan, 2020).

The initial process of developing the SEE Framework was meticulous and thorough. First, Callan and colleagues performed literature searches and ancestral reviews to ensure that there was no existing framework that already fulfilled the purposes of the one being created. Second, they generated a list of SRL supportive practices by using the following search terms on various search engines (i.e., Google Scholar, Ebscohost, etc.): "teacher practices, teaching, pedagogy with the following terms self-regulated learning, SRL, self-regulation, metacognition, and motivation" (Callan et al., 2020, p. 9). After an initial screening, any articles that were deemed relevant were examined thoroughly. Once this was accomplished, researchers performed additional academic database searches to determine if there was empirical evidence supporting the use of each practice generated from the initial literature review. Any practices that did not have empirical evidence, specifically evidence that illustrated an experimental or correlational connection between the practices and the development of SRL, from a peer-reviewed source were then eliminated from the list.

At this point in the research process, Callan and colleagues then went through and eliminated practices that focused primarily on encouraging motivational beliefs (Callan et al., 2020). This was done for a couple reasons, despite the fact that motivational beliefs play a

significant role in the development of SRL (Efklides, 2011). First of all, there were already a number of adequate frameworks in existence that detailed various practices useful for motivating students (ex. The TARGET model; Ames, 1990). Secondly, researchers wished to make the framework simple and reduce the amount of effort it would take to digest all or the information it provided. Finally, Callan and colleagues then contacted a few leading experts in the field to gauge the effectiveness of the model, and incorporated the feedback they received while refining the model.

As a result of these search procedures, Callan and colleagues were able to identify three conceptual groups of SRL practices that are the basis for the SEE Framework. These three groups were as follows: practices that yield a setting conducive to SRL, (b) exchanges between teacher and student that encourage SRL development, and (c) learning events that give students the chance to use SRL skills (see Table 1 for an overview; Callan, 2020). Each group is elaborated on below (see Table 1).

Table 1.
Brief Overview of the SEE Framework (Callan et al., 2020)

Setting	Exchanges	Events
● Supportive student-teacher relationships ● Routines and participation structures ● Collaborative learning ● Enable adaptive help-seeking and help-giving	● Explicit instruction ● Modeling ● SRL feedback ● Prompts ● Create connections between SRL and success	<u>Features of coursework</u> ● Multiple opportunities for learning ● Rich learning tasks ● Long term tasks ● Appropriate challenge level ● Allow student autonomy <u>Actions</u> ● Self-assessment ● Peer co-learning ● SRL worksheets

Fostering a Virtual Learning Environment that Facilitates SRL

A learning setting consists of the physical or virtual learning environment and the conditions in which students engage in the learning process. It takes into expected routines as well as the social context, both of which play a crucial role in the development of SRL among learners. In order for proper SRL development to occur, it is important to have a setting in which learners can be fully engaged and comfortably participate in the course. Online instructors can help accomplish this by developing supportive relationships with their students, carefully structuring their courses to promote participation, encouraging collaboration among students, and teaching productive help-seeking and help-giving behaviors (Callan, 2020).

Table 2.
Practices to create a Setting conducive to SRL (Callan et al., 2020)

Practice	**Definition and Example**
Student-teacher relationships	Teacher and student interactions can lead to effective and supportive relationships. When supportive relationships are in place, students feel safe to take academic risks, try new things, and engage in the classroom. ***Example – "I get to know my students personally and I am supportive."***
Create routines and participation structure	Having consistent and predictable routines and structures within the classroom. The function is to enable students to have regular control of their learning experience. Language that describes regularity is important. ***Example – "Students know about routines and have a series of tasks to complete in the morning such as turning in work to a homework basket, taking out their journals and responding to a prompt, and getting their next textbook prepared."***
Practice	**Definition and Example**

Position all members as learners and require students to make decisions by providing multiple options in difficulty level, criteria, and product type	It is helpful when teachers and students are all viewed as collaborative learners. For example, teachers may describe themselves as a discussion leader or facilitator. They may emphasize collaboration among teachers and students and engage in activities in which students can be part of the thinking, decision-making, and knowledge building process. This leads to deeper processing of information and adaptive use of strategies. Also, allowing students to make decisions regarding the difficulty level, criteria, and product type is relevant here. ***Example – "In my class, I let students know that I have learning to do as well and that their ideas are valued. I give them some freedom to select aspects of their assignments such as the level of difficulty, criteria, and product types."***
Develop environment where help-seeking is utilized effectively	Adaptive help-seeking leads to mastery of curriculum rather than simply getting the right answer. Teachers encourage adaptive help-seeking behaviors and provide appropriate support when students seek help adaptively. ***Example – "I teach students how to approach me for help in the classroom, but I emphasize that I am here to help them learn how to do the work and not to do the work for them".***

Teacher and Student Exchanges to Support SRL

Besides creating a learning environment that encourages the utilization of SRL, teachers have the opportunity to participate in a number of exchanges with those they teach in order to help them evolve in their capacity to be self-regulated learners. Settings and exchanges influence each other, as adaptive exchanges can enrich learning settings, which are then more conducive for adaptive exchanges. Teachers can implement a variety of exchanges in their classrooms, including the use of explicit instruction in how to use SRL skills, modeling SRL themselves, providing constructive feedback to students about their current use of SRL, prompting and cueing students to use the SRL practices they have learned, and reiterating the connection between academic achievement and the use of SRL. It is important to note that teachers may

have unique reasons for the particular exchanges that they choose to utilize. For example, some exchanges simply yield additional knowledge and expertise (i.e., modeling, explicit instruction) whereas others may emphasize the use of practices that slowly make students themselves the ones who are primarily in charge of their own learning (i.e., prompts, connecting achievement with SRL). Meanwhile, there are some exchanges (i.e., feedback) that are focused on helping students refine their use of SRL (Callan et al., in review).

Table 3.
Exchanges Supporting Student SRL (Callan et al., 2020)

Teaching Practices	**Definition / Examples**
Direct instruction/intervention in SRL skills	Students can develop SRL through direct/explicit instruction in SRL processes. This is the "how to" of SRL procedures and would include the delivery of SRL intervention programs. ***Example – "I teach students how to set goals, plan, use strategies, monitor, reflect adaptively, etc."*** ***"I implement SRSD in class to support students' SRL during writing."*** This does **<u>NOT</u>** include opportunities to practice the SRL skills without direct or explicit instruction.
Modeling of SRL skills	Teachers can model their use of SRL by verbalizing their thoughts to "think out loud" in front of their students. This would also include the physical use of SRL processes. Doing so helps students see how to use these practices and that competent individuals use these processes. ***Example - "I think out loud to describe how I use SRL to my students."*** **"I model how to deal with challenges and setbacks."**
Providing effective feedback	Providing feedback about one's learning processes can help students approach a task appropriately and develop process skills/goals. Feedback about grades without procedural feedback is not as helpful to the development of SRL.

	Example – "I provide feedback to my students about process. For example, when a student has difficulty organizing their thoughts in an essay, I remind them to create an outline first".
Support students to see connection between strategic action and outcomes	When students can see the connection between strategies and achievement, they can begin to attribute their successes to their approach / efforts as opposed to ability or aptitude. Doing so enhances motivation and an adaptive learning approach. This can be accomplished through explicit statements about this connection or can use graphs or visuals to illustrate the connection between grades and SRL practices. ***Example – "I have my students graph their test grades and the strategies they used to study for that test. We talk about these graphs upon the return of the test."***
Prompt students' metacognition and SRL	Teachers can prompt SRL via cues or strategic questions. ***Example – "I prompt my students to remind them to use the strategies that we have learned."*** ***I ask students questions that cue the use of strategies such as, "what strategy have we learned that would help with this task?"***

Learning Events that Teachers Design for Students

A final way that teachers are able to support the development of SRL skills is through the implementation of various learning events. Learning events differ from exchanges in that exchanges imply direct communication between teachers and students while events entail a broader scope of interactions between the students, their learning materials, and/or their peers that help facilitate SRL. Two types of events exist within the SEE framework: events that incorporate distinct characteristics into coursework and events that involve setting aside time for vital learning experiences. Examples of events that incorporate specific features into the coursework include: assigning rich learning tasks, keeping assignments at an appropriate challenge level, long-term assignments that involve repetition (i.e., writing multiple drafts of an

essay), and granting students a certain amount of autonomy. Other vital learning experiences include opportunities for self-assessment, peer co-learning, and the use of SRL worksheets (Callan et al., in review). These events will be discussed in greater depth at a later point in our discussion.

Table 4.
Learning Activities that Teachers Design to Support Student SRL (Callan et al., in review)

Category	**Activity**	**Definition**
Aspects of course work	Teachers engage students in iterative cycles of learning & long-term learning activities	Teachers can design learning activities in which students' complete multiple drafts or iterations of an assignment. It is critical that students participate in activities that extend beyond a single class session because it provides students with an opportunity to set goals, plan, check progress, reflect, and revise their plans and goals. Sustained attention to goals over time is also relevant here. ***Example – "I have my students write multiple drafts of a paper across the semester. The drafts increase in complexity over time."***
	Students complete appropriately challenging tasks	Teachers should design learning activities that are adequately challenging. Tasks that are too easy do not require students to be strategic in their learning. Furthermore, students may disengage entirely from tasks that are too difficult. ***Example - "My students complete tasks that are at the optimal difficulty level."***
	Students complete complex tasks	Teachers should engage students in meaningful activities that require multiple processes and involve large chunks of meaning. This is opposed to completing worksheets of simple, single step tasks and isolating skills. ***Example - "I have my students complete complex, authentic math tasks that integrate many skills they have learned throughout the semester."***
Category	**Activity**	**Definition**

Aspects of learning activities	Teachers foster self-assessment and self-reflection	Teachers should help their students engage in self-assessment / reflection of their work, growth, strengths and weaknesses. Doing so helps students develop awareness, which can facilitate remediation of deficits when they are present. ***Example – "I have my students complete progress monitoring charts, discuss their strengths, identify areas that need improvement, and ask them, 'how might we improve on these tasks?'"*** "I guide my students in self-reflection processes because students struggle to do so independently."
	Teachers integrate opportunities to use SRL skills with worksheets and activities	Students need opportunities to practice SRL processes. Thus, opportunities to set goals, plan, monitoring, and reflect is important. This practice **<u>DOES NOT</u>** include direct instruction / explicit instruction in these processes. Instead, activities such as completing a goal-setting form, or nightly homework planners would better align here. ***Example - "Students complete a weekly goal-setting sheet (no mention of training to teach goal-setting) or students complete nightly homework logs, which is a template where students can track and record homework practices."***
Category	**Activity**	**Definition**
Students engage in peer co-learning		SRL can be supported when students work with their peers and/or provide feedback about each other's work ***Example - "My students work together on projects and help to teach each other how to approach tasks."***

Objective of the current project

Despite the fact that research has identified several practices to support students' SRL skill development within face-to-face classrooms, there is a particular need to examine the empirical support of these practices within online learning environments. The purpose of this project is to address that research gap by systematically reviewing the existing literature to

identify the empirical support for SEE Framework practices within online or blended learning environments. In doing so, we address two key research questions.

First, we examine which practices already have empirical support in technologically supported learning environments.

Second, we want to identify which practices have no current support in these environments.

By doing this, we will be able to simultaneously provide teachers with a list of suggested practices for their online classrooms and point researchers towards practices that should be further explored through additional research.

Developing the Current SEE Framework Literature Review Process

Similar to the search procedure used for the original publication, the process of reviewing the literature relevant to the SEE Framework's use in online or blended classroom settings was extensive and methodical. The criteria for sources included in the final review were as follows. First, articles needed to be peer-reviewed and written in English (or have an English translation available). Second, the research had to be conducted in an online or blended learning environment. Third, articles needed to show an empirical link between the practice and SRL skill development of learners.

To find relevant articles, we began with an initial search through articles referenced within the original SEE framework (Callan et al., 2020). To do so, abstracts and manuscripts were read to determine if they were conducted within an online environment. As a result, six articles were identified. Next, we conducted a thorough search for articles related to each of 17 SEE model practices. We used the following databases: "Academic Search Ultimate", "APA Psycinfo", "Education Full Text (H. W. Wilson)", "Education Source", "ERIC", "Psychology

and Behavioral Sciences Collection", and "Teacher Reference Center." A complete list of search terms, along with the number of results that they yielded can be found in the chart below.

Table 5.
SEE Framework search terms and the number of articles yielded

Search Term	Initial Results	Final result
"self-regulated learning" & "online" & "supportive relationships"	8	2
"self-regulated learning" & "online" & "student teacher relationships"	121	4
"self-regulated learning" & "distance learning or distance education or online learning" & "routine"	9	1
"Self-regulated learning" & "distance learning or distance education or online learning" & "collaborative learning with peers"	17	7
"Self-regulated learning" & "distance learning or distance education or online learning" & "online collaborative group work"	3	0
"Self-regulated learning" & "distance learning or distance education or online learning" & "collaborative behaviors"	19	6
"self-regulated learning" & "distance learning or distance education or online learning" & "explicit instruction"	10	0
"self-regulated learning" & "distance learning or distance	55	8

education or online learning" & "SRL feedback"		
"self-regulated learning" & "distance learning or distance education or online learning" & "prompts"	90	10
"self-regulated learning" & "distance learning or distance education or online learning" & "connections between SRL and success"	1	0
"self-regulated learning" & "distance learning or distance education or online learning" & "connection to success"	6	1
"self-regulated learning" & "distance learning or distance education or online learning" & "multiple learning opportunities"	8	2
"self-regulated learning" & "distance learning or distance education or online learning" & "rich learning tasks"	4	1
"self-regulated learning" & "distance learning or distance education or online learning" & "long term tasks"	6	4
"self-regulated learning" & "distance learning or distance education or online learning" & "long term learning"	38	2
"self-regulated learning" & "distance learning or distance education or online learning" & "appropriate challenge"	4	0

“self-regulated learning” & “distance learning or distance education or online learning” & “appropriate level”	15	2
“self-regulated learning” & “distance learning or distance education or online learning” & “appropriate scaffolding”	4	0
“self-regulated learning” & “distance learning or distance education or online learning” & “lead by example”	2	1
“self-regulated learning” & “distance learning or distance education or online learning” & “modeling NOT model”	55	6
“self-regulated learning” & “distance learning or distance education or online learning” & “allow student autonomy”	3	1
“self-regulated learning” & “distance learning or distance education or online learning” & “encouraging student autonomy”	4	0
“self-regulated learning” & “distance learning or distance education or online learning” & “self-assessment”	86	0
“self-regulated learning” & “distance learning or distance education or online learning” & “completing self-assessments”	2	1
“self-regulated learning” & “distance learning or distance education or online learning” & “SRL worksheets”	0	0

"self-regulated learning" & "distance learning or distance education or online learning" & "Self-regulated learning worksheets"	2	0

Note: Some articles are found in multiple searches.

Finally, we went through the reference sections of the located articles to search for additional sources related to online learning (i.e., an ancestral search). Altogether, these research techniques yielded 132 articles. Once the initial list of potential references was compiled, a close reading of each article was performed to ensure that it was a good fit for the project at hand. This reduced the number of relevant articles to 70.

Results

Following the search procedures, we addressed our two research questions, "drop those research questions back into here." With the exception of SRL worksheets, every single practice within the SEE Framework had at least one study endorsing its use within an online or blended learning environment. We elaborate on the findings for each specific practice below.

Settings

First, we elaborate on SRL practices related to learning settings, such as fostering adaptive student-teacher relationships, creating routines and participation structures, positioning all members of the class as learners, as well as help-seeking and help-giving behaviors. See Table 6 for references that support the relationship between this practice and SRL.

Table 6.
Practices to create a setting conducive to SRL

Practice	References supporting online instruction
Foster adaptive student-teacher relationships	• An & Mindrila, 2020 • Harder & Abuhamdieh, 2015 • Pilotti et al., 2017 • Shea & Bidjerano, 2010 • Yen et al., 2005
Create routines and participation structure	• Andrade, 2014 • Awofeso et al., 2016 • Bosman et al., 2020 • Hsu et al., 2009 • Kahu et al., 2014 • Montgomery et al., 2019 • Rabin et al., 2019 • Theunissen & Stubbé, 2014
Collaborative learning/Position all members as learners	• Lin et al., 2016 • Lin, 2018 • Tsai, 2013a • Wise & Hsiao, 2019 • Zheng et al., 2019
Develop students' help-seeking and help giving skills	• Ambreen et al., 2016 • Harwood & Koyama, 2020 • Schworm & Gruber, 2012

Note.
See Appendix A for full citations of articles in table.

Supportive Student-Teacher Relationships

Creating supportive relationships with students is one of the most important things that a teacher can do for SRL development in an online or blended learning environment. Not only do high amounts of student-teacher interactions lead to an increase in SRL (Yen et al., 2005), a strong teacher presence also leads to higher levels of student self-efficacy (Shea & Bidjerano, 2010). Furthermore, positive regard from instructors towards their students often leads to better grades and positive student learning outcomes (Harder & Abuhamdieh, 2015; Pilotti et al.,

2017). Teachers can build caring relationships with their students by taking time to get to know individual students (i.e., having individual conversations, assigning "All About Me" worksheets, listening to students, etc.), offering praise and encouragement, and tapping into online communication platforms to provide seamless ways for students to reach out (i.e., providing a Google form where students can anonymously ask for help; An & Mindrila, 2020).

Routines and participation structures

In addition to being kind and approachable, teachers can aid students in their use of SRL through the way they structure their classes. Especially in online classes, offering students flexibility with when and where they study helps ensure that they have ample opportunities to complete their coursework, all while balancing other life demands (i.e. work, family, etc.; Kahu et al., 2014). That being said, SRL is supported when instructors establish routines (Andrade, 2014; Bosman et al., 2020). Teachers can find balance between these two demands by making online assignments available anytime (and anywhere), picking a user-friendly platform for coursework, as well as encouraging students to access their course material frequently and to plan out their schedule in advance, adjusting as needed (Awofeso et al., 2016; Hsu et al., 2009; Montgomery et al., 2019; Theunissen & Stubbé, 2014).

Position all members as learners

Another way that teachers can promote SRL in their online classrooms is through positioning all students in the class as learners. This can be done in a variety of ways, such as providing individual students with SRL feedback and utilizing peer evaluations during group projects. Research has shown that taking these measures leads to better grades, less "freeriding" in group projects, and an increase in SRL (Lin, 2018; Tsai, 2013a). This is especially true for students who initially display less developed SRL (Lin et al., 2016).

Adaptive help-seeking and help-giving

Occasionally, when students are struggling, adaptive help-seeking and help-giving can be extremely beneficial. Schworm & Gruber (2012) found that when given prompts encouraging adaptive help-seeking, online students were more likely to report higher levels of engagement in the class, take initiative, and explicitly refer to the course material. A more recent study performed in the context of the COVID-19 pandemic revealed that students who engaged in adaptive help-seeking behaviors during online writing tutoring developed a stronger sense of agency and autonomy, as well as strategically engaged with course material more often (Harwood & Koyama, 2020). Finally, Ambreen and colleagues (2016) found that help-giving behaviors from students who were excelling served as important social support for students learning to become self-regulated learners.

Exchanges

Here, we discuss findings related to exchanges that promote SRL such as explicit instruction, modeling of SRL skills, effective feedback, illuminating connections between strategic action and outcomes, and prompts that encourage SRL use. See Table 7 for references that support the relationship between this practice and SRL.

Table 7.
Exchanges between students and teachers that support Student SRL

Teaching Practices	**References supporting online instruction**
Explicit instruction	• Kramarski & Gutman, 2006 • Moos & Azevedo, 2008
Modeling of SRL skills	• Atkinson, 2002 • Kostons, et al., 2012 • Lee, 2016 • Raaijmakers et al., 2017

Effective feedback	• Andrade, 2014 • Kauffman, 2004 • Kim et al., 2014 • Kramarski & Dudai, 2009 • Lee et al., 2010 • Lim et al, 2021 • Thibodeaux & Harapnuik, 2020 • Tsai, 2013b • Tsai, 2014 • van den Boom et al., 2004 • Zou & Zhang, 2013
Illuminate connection between strategic action and outcomes	● Handoko et al., 2019 ● Lee et al., 2010 ● Vanslambrouck et al., 2019
Use prompts and cues to increase strategic thinking and action and elicit metacognition	● Crippen & Earl, 2007 ● Fung et al., 2019 ● Hilbert & Renkl, 2009 ● Kauffman, 2004 ● Kauffman et al., 2011 ● Lehmann et al., 2014 ● Schworm & Gruber, 2012 ● van den Boom et al., 2004 ● Wong et al., 2021 ● Wong et al., 2019

Note.
See Appendix A for full citations of articles in table.

Explicit instruction and modeling

Closely related to the idea of help-seeking are the concepts of explicit instructions and modeling (teaching by example). Explicit instruction further aids students by leading to more intentional planning, improvements in self-monitoring, better problem-solving skills, and an increased ability to transfer the use of the strategy being taught to other situations (Kramarski & Gutman, 2006; Moos & Azevedo, 2008). Especially when a student is first learning a new SRL skill, modeling can help facilitate further development of SRL and increase the amount of

knowledge acquired from their use (Kostons et al., 2012). Likewise, it can lead to improvements in problem-solving, levels of student autonomy, course satisfaction, and comfort levels among students (Lee, 2016; Raaijmakers et al., 2017).

Provide process and growth-oriented feedback

One of the most well-supported practices in the SEE Framework is the provision of process and growth-oriented feedback. Numerous studies indicate that constructive feedback in online learning is associated with better comprehension of the material, better academic performance, increased levels of involvement in class, and higher levels of SRL (Kauffman, 2004; Kim et al., 2014; Kramarski & Dudai, 2009; Lee et al., 2010; Lim et al, 2021; Tsai, 2013b; Tsai, 2014; Zou & Zhang, 2013). Furthermore, Andrade (2014) found that a lack of dialogue between teachers and students was associated with superficial completion of learning activities, completing tasks out of order, and ignoring tasks all together. Thus, it is extremely important that teachers give feedback, not just on overall outcomes (i.e., grades) but on the process they are using to get to complete assignments (i.e. their use of SRL strategies; van den Boom et al., 2004).

Prompts and Cues

One of the other practices that had a substantial amount of support for it was the provision of prompts and cues. Much like many of the other practices, prompts have the capacity to help students achieve better learning outcomes, become more motivated to participate, increase their self-efficacy, and enhance their SRL skills (Crippen & Earl, 2007; Kauffman et al., 2011; Lehmann et al., 2014; Schworm & Gruber, 2012; Wong et al., 2021). It is important to note that some types of prompts are more effective in supporting SRL. According to both van den Boom and colleagues (2004) as well as Wong et al. (2019), prompts that specifically

reference SRL strategies are perceived as more effective than prompts that fail to mention SRL. A couple examples of effective prompts that facilitate SRL development include self-explanation prompts (i.e. students explain to themselves the steps taken to solve a math equation; Crippen & Earl, 2007) and self-monitoring prompts (i.e. students are asked to keep track of their progress and consider factors that contributed to it; Kauffman et al., 2011).

Create connections between SRL and success

Perhaps one of the most effective ways to motivate students to utilize SRL strategies is through demonstrating the connections between SRL and success (Vanslambrouck et al., 2019). This is because when students see the value in regulating, they are more likely to complete the task, which in turn, increases their chances of success in a course (Handoko et al., 2019). Thus, it is extremely important for teachers to do everything in their power to help their students see the utility in both distance education in general, and the use of SRL in these distance education classes.

Iterative cycles of learning and long-term learning activities

As discussed earlier, there are several classroom activities that teachers can implement into their online curriculums in the hopes of promoting SRL. This includes activities that allow multiple opportunities to practice SRL skills, as well as long-term learning tasks. Research indicates that iterative learning experiences led to several long-term benefits, including higher levels of academic achievement and transfer of SRL skills to other learning tasks (Schnackenberg & Sullivan, 2000; Sonnenberg & Bannert, 2019; Tsai et al., 2013). Moreover, research shows that project-based learning activities develop students' SRL skills (Mou, 2020). This is because doing well on long-term tasks normally necessitates the use of key SRL skills, such as planning ahead

and managing one's time wisely (Hu & Driscoll, 2013; Sitzmann & Johnson, 2012; Uzir et al., 2020).

Rich learning tasks:

Closely related to the previous practice, online teachers can increase SRL use by assigning rich learning tasks that require multiple skills to complete. For example, Ambreen and colleagues (2016) interviewed a group of college students enrolled in a distance education program and found that they viewed multi-step presentations as highly effective assignments for helping them develop SRL skills. The teachers also agreed with this assessment, explaining that they designed these projects in such a way that students were forced to go through a multi-step process to complete them (i.e. they had to analyze a question, break it into multiple parts, plan ahead to find informational sources, and then outline their answers.

Appropriate Challenge Level:

When assigning long projects and rich learning tasks, it is critical that the teacher ensure that these tasks are appropriately challenging but nevertheless doable. This is because perceived challenge levels play a major role in student motivation and effort (Hiemstra & Yperen, 2015). Providing scaffolding in blended or online environments is especially beneficial for lower performing students (Winters & Azevedo, 2005), and leads to better planning and academic performance (Moos & Azevedo, 2008; Zheng, 2016). Teachers can help online students gradually complete increasingly difficult tasks by exposing them frequently to e-learning resources, taking the time to adequately explain how to navigate the online platforms being used, and implementing intervention programs to provide scaffolding (Mohammadi & Araghi, 2013; So et al., 2019).

Autonomy:

The other thing that is important to keep in mind when creating assignments is intentionally giving students adequate autonomy. Lee et al. (2016) found that providing appropriate scaffolding (which we just discussed), contributes to the promotion of student autonomy. Student autonomy then leads to higher levels of course satisfaction and goal-attainment. Likewise, they found that students who are given a healthy amount of autonomy are more likely to be receptive to constructive feedback, when it is given (Thibodeaux & Harapnuik, 2020).

Events:

Finally, we outline the empirical support related to events that support SRL such as iterative and long-term learning activities, appropriately challenging tasks, rich learning tasks, allowing student autonomy, self-reflection, SRL worksheets, and peer co-learning. See Table 8 for references that support the relationship between this practice and SRL.

Table 8.
Learning Events that teachers can design to support SRL development.

Activity	**References supporting online instruction**
Iterative cycles of learning and long-term learning activities	• Chang et al., 2013 • Hu & Driscoll, 2013 • Mou, 2020 • Schnackenberg & Sullivan, 2000 • Sitzmann & Johnson, 2012 • Sonnenberg & Bannert, 2019 • Tsai et al., 2013 • Uzir et al., 2020

Appropriately challenging tasks	● Hiemstra & Yperen, 2015 ● Kim & Frick, 2011 ● Mohammadi & Araghi, 2013 ● Moos & Azevedo, 2008 ● So et al., 2019 ● Winters & Azevedo, 2005 ● Zheng, 2016
Students complete rich tasks	• Ambreen et al., 2016 • Lin et al., 2020 • Zheng et al., 2020
Allow student autonomy	● Lee et al., 2016 ● Thibodeaux & Harapnuik, 2020
Self-assessment and self-reflection	• Aleven & Koedinger, 2002 • Fung et al., 2019 • Kostons et al., 2010 • McKenna et al., 2019 • Mou, 2020 • Theunissen & Stubbé, 2014
SRL worksheets	• N/A
Peer co-learning	• Garcia & Privado, 2020 • Kim et al., 2014 • Wang & Hong, 2018

Events: Students Complete Important Learning Experiences:

Besides giving out assignments with key features that encourage SRL, teachers should also offer their students opportunities to engage in critical learning processes. One such that is critical for SRL development is self-assessment and/or self-reflection (Fung et al., 2019). Both students and teachers tend to view self-assessment and reflection in a positive light (Theunissen & Stubbé, 2014), as it helps all parties involved stay organized, keep track of progress that has been made, and make adjustments accordingly (Mou, 2020). In addition, students who engage in self-explanation (a type of self-assessment where students explain to themselves the steps they

are taking to complete a task) were able to gain a deeper understanding of the learning material (Aleven & Koedinger, 2002).

Another tactic that teachers can keep in mind is assigning online peer co-learning experiences. These types of learning activities often enable students to accomplish a goal collectively with their peers as opposed to relying on their teacher. Thus, this increased level of responsibility for students encourages students to engage in a variety of SRL activities (i.e., goal-setting, resource management, planning, reflection, etc.; Kim et al., 2014). It is worth noting that levels of group cohesion and engagement in discussions that require higher levels of cognition are significant predictors of which groups will do well (Wang & Hong, 2018). Thus, it is critical for the teacher to monitor the groups and intervene if there are low levels of either of these predictors.

In the original SEE Framework for face-to-face classrooms described "SRL worksheets" which entail an opportunity for students to engage in regulatory behaviors in the absence of direct support or instruction from the teacher. For example, students can be asked to complete a weekly goal-setting sheet or to fill out a daily planner. (Callan et al., in review). However, as was mentioned earlier, we failed to find any research indicating that these worksheets are effective at promoting SRL in the context of blended or online environments. Several factors could account for this. For one, when we think of the word "worksheet" the thing that comes to mind for many people is a piece of paper. However, for online students, the majority of the work is done on the computer. Perhaps there are online learning tasks that fulfill the same goal as these worksheets but the literature calls them something other than worksheets. Further limitations that may have contributed will be discussed further along in the discussion.

Conclusion

Caveats of the SEE Framework

In conclusion, this systematic review has highlighted the fact that the majority of the SEE Framework is empirically supported in blended and online learning environments. However, not all practices should be applied all at once for every single student. For example, a struggling student who is starting an intervention program will likely benefit from explicit instruction or modeling before large amounts of autonomy are granted (Callan et al., in review). Thus, it is important for teachers to be cognizant of the individual needs of their students when considering which practices to apply and with whom to apply them.

Another caveat of the SEE Framework to keep in mind is that many of the practices are interconnected. For example, if a student has a supportive relationship with their teacher, they may be more likely to initiate an exchange (i.e., ask for constructive SRL feedback). Likewise, some of the practices overlap with each other conceptually. For example, part of successful peer co-learning involves positioning every student as a learner and participant in the activity (Callan et al., in review).

Limitations

As mentioned earlier, the majority of the practices in the SEE Framework had at least one study supporting its use in an online or blended learning environment. However, some practices had more empirical support than others. For example, we were able to find 11 articles supporting the practice of giving effective feedback, whereas just two articles mentioned the successful implementation of explicit instruction. So, while very few practices were found to be completely without support, the number of studies regarding each practice should be taken into consideration. There are a number of possible reasons that may account for a limited number of supporting articles for some practices such as not exploring all potential academic databases (i.e.,

Google Scholar). A future attempt to systematically review the research may want to consider branching out and utilizing more databases.

Another limitation to keep in mind are the lack of inclusivity with the search terms themselves. Specific wordings yield specific results, so utilizing more variations with the various search terms may have led to more empirical evidence.

Other limitations to consider include the fact that only articles written in English were evaluated as well as the fact that some of the articles were a little older, and with technology evolving as fast as it is, that could have implications for many aspects of the course (i.e., participation structure- today's zoom class is somewhat different from yesterday's self-guided tutorial). Finally, it is possible that the author held an unknown bias when evaluating which articles were the best fit for the review, and may have failed to include some relevant studies.

Future Research

The results gleaned from this study leave a great deal of room for future research. In addition to what was mentioned earlier regarding an even more comprehensive systematic review of the literature, researchers may choose to specifically focus their time and attention on the practices with little or no empirical support in online environments. For example, despite how important it is in the SRL process, there were only two articles found with research supporting student autonomy in online environments. Those interested in furthering the research may wish to do a systematic review of the literature on that practice specifically, to confirm that there is a dearth in the existing research on that subject. Then, if they still fail to find empirical support, they may consider creating an experiment designed to evaluate the practice in an online or blended environment. However, despite the shortage in research confirming the utility of

some practices in the SEE Framework, there is still a significant enough amount of evidence for teachers to begin implementing it in their technology enabled classrooms.

References

Adesope, O. O., Zhou, M., & Nesbit, J. C. (2015). Achievement goal orientations and self-reported study strategies as predictors of online studying activities. *Journal of Educational Computing Research*, *53*(3), 436–458. https://doi-org.dist.lib.usu.edu/10.1177/0735633115603989

Aleven, V. A. W. M. M., & Koedinger, K. R. (2002). An effective metacognitive strategy: learning by doing and explaining with a computer-based cognitive tutor. *Cognitive Science, 26*, 147-179. doi:10.1016/S0364-0213(02)00061-7.

Ambreen, M., Haqdad, A., & Saleem, W. A. (2016). Fostering self-regulated learning through distance education: A case study of M. Phil secondary teacher education program of Allama Iqbal Open University. *Turkish Online Journal of Distance Education*, *17*(3), 120-135.

Ames, C. (1990). Motivation: What teachers need to know. *Teachers College Record, 91*, 409–421.

An, Y., & Mindrila, D. (2020). Strategies and tools used for learner-centered instruction. *International Journal of Technology in Education and Science*, *4*(2), 133–143.

Andrade, M. S. (2014). Dialogue and structure: Enabling learner self-regulation in technology-enhanced learning environments. *European Educational Research Journal*, *13*(5), 563–574.

Awofeso, N., Hassan, M., & Hamidi, S. (2016). Individual and collaborative technology-mediated learning using question & answer online discussion forums – perceptions of Public Health learners in Dubai, UAE. *Open Learning*, *31*(1), 54–63. https://doi-org.dist.lib.usu.edu/10.1080/02680513.2015.1120662

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

Bandura, A. (1997). Self-efficacy: *The exercise of control.* W.H. Freeman and Company.

Barnard-Brak, L., Lan, W. Y., & Paton, V. O. (2010). Profiles in Self-Regulated Learning in the Online Learning Environment. *International Review of Research in Open & Distance Learning, 11*(1), 61–79.

Bosman, L., Roy, S., McDonald, W., & Ababei, C. (2020). Using online discussions to connect theory and practice in core engineering undergraduate courses. *Computer Applications in Engineering Education*, *28*(3), 675–691. https://doi-org.dist.lib.usu.edu/10.1002/cae.22238

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education, 27*, 1–13. doi:10.1016/j.iheduc.2015.04.007

Callan, G. (2020). Settings, exchanges, and events: The SEE framework of self-regulated learning supportive practices. *Psychology in the Schools*, Online first.

Callan, G. L., & Cleary, T. J. (2019). Examining cyclical phase relations and predictive influences of self-regulated learning processes on mathematics task performance. Metacognition and Learning 14 (1), 43–63.

Callan, G. L., Marchant, G. J., Finch, W. H., & Flegge, F. (2017). Students and school SES, gender, strategy use, and achievement. *PsycholSchs*. *00*: 1–17 https://doi.org/10.1002/pits.22049

Cantrell, S. C., Almasi, J. F., Rintamaa, M., Carter, J. C., Pennington, J., & Buckman, D. M. (2014). The impact of supple-mental instruction on low-achieving adolescents' reading

engagement. *Journal of Educational Research, 107*(1), 36–58. https://doi.org/10.1080/00220671.2012.753859

Cleary, T. J., & Callan, G. L. (2017). Assessing self-regulated learning using microanalytic methods. In D. H. Schunk & J. Greene (Eds.), Handbook of self-regulation of learning and performance (2nd ed., pp. 338 – 351). New York: Routledge.

Cleary, T. J., Platten, P., & Nelson, A. (2008). Effectiveness of the self-regulated empowerment program with urban high school students. Journal of Advanced Academics, 2 (1), 70–107. https://doi.org/10.4219/jaa-2008-866.

Cleary, T. J., & Zimmerman, B. J. (2004). Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the Schools, 41*(5), 537-550. doi: 10.1002/pits.10177

Cleary, T. J., Zimmerman, B. J., & Keating, T. (2006). Training physical education students to self-regulate during basketball free throw practice. *Research Quarterly for Exercise & Sport*, *77*(2), 251–262. https://doi-org.dist.lib.usu.edu/10.5641/027013606X13080769704640

Crippen, K. J., & Earl, B. L. (2007). The impact of web-based worked examples and self-explanation on performance, problem solving, and self-efficacy. *Computers & Education*, *49*(3), 809–821. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2005.11.018

Cuenca-Carlino, Y., Freeman-Green, S., Stephenson, G. W., & Hauth, C. (2016). Self-regulated strategy development instruction for teaching multi-step equations to middle school students struggling in math. *Journal of Special Education, 50*(2), 75–85. doi:10.1177/0022466915622021

DaVia Rubenstein, L., Callan, G. L., & Ridgley, L. M. (2018). Anchoring the creative process within a self-regulated learning framework: Inspiring assessment methods and future research. *Educational Psychology Review*, *30*(3), 921–945. https://doi-org.dist.lib.usu.edu/10.1007/s10648-017-9431-5

Dent, A. L., & Koenka, A. C. (2016). The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educational Psychology Review, 28*(3), 425-474. doi:10.1007/s10648-015-9320-8

Desautel, D. (2009). Becoming a thinking thinker: Metacognition, self-reflection, and classroom practice. *Teachers CollegeRecord, 111*(8), 1997–2020.

Du, J., Xu, J., & Fan, X. (2015). Investigating factors that influence students' management of study environment in online collaborative group work. *Research Papers in Education*, *30*(4), 451–468. https://doi-org.dist.lib.usu.edu/10.1080/02671522.2014.940373

Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist, 46*(1), 6–25. doi:10.1080/00461520.2011.538645.

Elstad, E. (2006). Understanding the nature of accountability failure in a technology-filled, laissez-faire classroom: disaffected students and teachers who give in. *Journal of Curriculum Studies*, *38*(4), 459–481. https://doi-org.dist.lib.usu.edu/10.1080/00220270500508901

Fung, C. Y., Abdullah, M. N. L. Y., & Hashim, S. (2019). Improving self-regulated learning through personalized weekly e-Learning journals: A time series quasi-experimental study. *E-Journal of Business Education and Scholarship of Teaching*, *13*(1), 30–45.

Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood

through adolescence: Growth trajectories in two male-sex-typed domains. *Developmental Psychology, 38*(4), 519–533. doi:10.1037/0012-1649.38.4.519

Graham, S. & Harris, K.R. (2009). Almost 30 years of writing research: Making sense of it all with the wrath of Khan. *Learning Disabilities Research & Practice, 24*(2), 58-68. doi:10.1111/j.1540-5826.2009.01277.x

Graham, S., McKeown, D., Kiuhara, S., & Harris, K. R. (2012). A meta- analysis of writing instruction for students in the elementary grades. Journal of Educational Psychology, 104 (4), 879 – 896. https://doi.org/10.1037/a0029185.

Graham, S., Harris, K. R., & McKeown, D. (2013). The writing of stu- dents with LD and a meta-analysis of SRSD writing intervention studies: Redux. In L. Swanson, K. R. Harris, & S. Graham (Eds.), Handbook of learning disabilities (2nd ed., pp. 405 – 438). New York, NY: Guilford.

Greene, J. A., Mason Bolick, C., Caprino, A. M., Deekens, V. M., McVea, M., Seung Yu, & Jackson, W. P. (2015). Fostering high-school students' self-regulated learning online and across academic domains. *High School Journal*, *99*(1), 88–106. https://doi-org.dist.lib.usu.edu/10.1353/hsj.2015.0019

Handoko, E., Gronseth, S. L., McNeil, S. G., Bonk, C. J., & Robin, B. R. (2019). Goal Setting and MOOC Completion: A Study on the Role of Self-Regulated Learning in Student Performance in Massive Open Online Courses. *International Review of Research in Open & Distance Learning*, *20*(3), 39–58. https://doi-org.dist.lib.usu.edu/10.19173/irrodl.v20i4.4270

Harder, J. T., & Abuhamdieh, A. H. (2015). The role of positive regard in self-regulated learning: An analysis of student evaluation data. *Journal of College Teaching &*

Learning, *12*(2), 109–120.

Harwood, C., & Koyama, D. (2020). Creating a virtual writing center to support self-regulated learning. *Studies in Self-Access Learning Journal*, *11*(3), 164–186. https://doi-org.dist.lib.usu.edu/10.37237/110306

Hiemstra, D., & Yperen, N. (2015). The effects of strength-based versus deficit-based self-regulated learning strategies on students' effort intentions. *Motivation & Emotion*, *39*(5), 656–668. https://doi-org.dist.lib.usu.edu/10.1007/s11031-015-9488-8

Hong, J. C., Lee, Y. F., & Ye, J. H. (2021). Procrastination predicts online self-regulated learning and online learning ineffectiveness during the coronavirus lockdown. *Personality & Individual Differences*, *174*. https://doi-org.dist.lib.usu.edu/10.1016/j.paid.2021.110673

Hsu, Y. C., Ching, Y. H., Mathews, J. P., & Carr-Chellman, A. (2009). Undergraduate students' self-regulated learning experience in web-based learning environments. *Quarterly Review of Distance Education*, *10*(2), 109–251.

Hu, H., & Driscoll, M. P. (2013). Self-regulation in e-learning environments: A remedy for community college? *Educational Technology & Society*, *16*(4), 171–184.

Kahu, E. R., Stephens, C., Zepke, N., & Leach, L. (2014). Space and time to engage: Mature-aged distance students learn to fit study into their lives. *International Journal of Lifelong Education*, *33*(4), 523–540. https://doi-org.dist.lib.usu.edu/10.1080/02601370.2014.884177

Kauffman, D. F. (2004). Self-Regulated Learning in web-based environments: Instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs. *Journal of Educational Computing Research*, *30*(1/2), 139–161.

https://doi-org.dist.lib.usu.edu/10.2190/AX2D-Y9VM-V7PX-0TAD

Kauffman, D. F., Zhao, R., & Yang, Y. S. (2011). Effects of online note taking formats and self-monitoring prompts on learning from online text: Using technology to enhance self-regulated learning. *Contemporary Educational Psychology*, *36*(4), 313–322.

Kim, R., Olfman, L., Ryan, T., & Eryilmaz, E. (2014). Leveraging a personalized system to improve self-directed learning in online educational environments. *Computers & Education*, *70*, 150–160. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2013.08.006

Kostons, D., van Gog, T., & Paas, F. (2010). Self-assessment and task selection in learner-controlled instruction: Differences between effective and ineffective learners. *Computers & Education*, *54*(4), 932–940. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2009.09.025

Kostons, D., van Gog, T., & Paas, F. (2012). Training self-assessment and task-selection skills: A cognitive approach to improving self-regulated learning. *Learning and instruction, 22*(2), 121-132.

Kramarski, B., & Dudai, V. (2009). Group-metacognitive support for online inquiry in mathematics with differential self-questioning. *Journal of Educational Computing Research*, *40*(4), 377–404.

Kramarski, B., & Gutman, M. (2006). How can self-regulated learning be supported in mathematical E-learning environments? *Journal of Computer Assisted Learning*, *22*(1), 24–33. https://doi-org.dist.lib.usu.edu/10.1111/j.1365-2729.2006.00157.x

Lawanto, O., Santoso, H. B., Lawanto, K. N., & Goodridge, W. (2014). Self-regulated learning skills and online activities between higher and lower performers on a web-intensive undergraduate engineering course. *Journal of Educators Online*, *11*(3), 1–32.

https://doi-org.dist.lib.usu.edu/10.9743/JEO.2014.3.2

Lee, H. W., Lim, K. Y., & Grabowski, B. L. (2010). Improving self-regulation, learning strategy use, and achievement with metacognitive feedback. *Educational Technology Research and Development, 58*(6), 629-648.

Lee, L. (2016). Autonomous learning through task-based instruction in fully online language courses. *Language Learning & Technology*, *20*(2), 81–97.

Lehmann, T., Hähnlein, I., & Ifenthaler, D. (2014). Cognitive, metacognitive and motivational perspectives on preflection in self-regulated online learning. *Computers in Human Behavior*, *32*, 313–323. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2013.07.051

Li, K. (2019). MOOC learners' demographics, self-regulated learning strategy, perceived learning and satisfaction: A structural equation modeling approach. *Computers & Education*, *132*, 16–30. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2019.01.003

Lim, L. A., Gentili, S., Pardo, A., Kovanovic Ä., Whitelock-Wainwright, A., Gasevic, D., & Dawson, S. (2021). What changes, and for whom? A study of the impact of learning analytics-based process feedback in a large course. *Learning and Instruction, 72*. https://doi-org.dist.lib.usu.edu/10.1016/j.learninstruc.2019.04.003

Lin, J. W. (2018). Effects of an online team project-based learning environment with group awareness and peer evaluation on socially shared regulation of learning and self-regulated learning. *Behaviour & Information Technology*, *37*(5), 445–461. https://doi-org.dist.lib.usu.edu/10.1080/0144929X.2018.1451558

Lin, J., Lai, Y., & Chang, L. (2016). Fostering self-regulated learning in a blended environment using group awareness and peer assistance as external scaffolds. *Journal of Computer Assisted Learning*, *32*(1), 77–93. https://doi-org.dist.lib.usu.edu/10.1111/jcal.12120

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I—Outcome and process. *British Journal of Educational Psychology, 46* (1), 4–11.

McElrath, K. (2020, August 26). *Nearly 93% of households with school-age children report some form of distance learning during COVID-19*. United States Census Bureau. https://www.census.gov/library/stories/2020/08/schooling-during-the-covid-19-pandemic.html

Mohammadi, P., & Araghi, S. M. (2013). The relationship between learners' self-directed learning readiness and their English for specific purposes course accomplishment at distance education in Iran. *Studies in Self-Access Learning Journal*, *4*(2), 73–84. https://doi-org.dist.lib.usu.edu/10.37237/040202

Montgomery, A. P., Mousavi, A., Carbonaro, M., Hayward, D. V., & Dunn, W. (2019). Using learning analytics to explore self-regulated learning in flipped blended learning music teacher education. *British Journal of Educational Technology*, *50*(1), 114–127. https://doi-org.dist.lib.usu.edu/10.1111/bjet.12590

Moos, D. C., & Azevedo, R. (2008). Monitoring, planning, and self-efficacy during learning with hypermedia: the impact of conceptual scaffolds. *Computers in Human Behavior*, *24*(4), 1686-1706. doi:10.1016/j.chb.2007.07.001.

Mou, T. Y. (2020). Students' evaluation of their experiences with project-based learning in a 3D design class. *Asia-Pacific Education Researcher*, *29*(2), 159–170.

Pilotti, M., Anderson, S., Hardy, P., Murphy, P., & Vincent, P. (2017). Factors related to cognitive, emotional, and behavioral engagement in the online asynchronous classroom. *International Journal of Teaching and Learning in Higher Education*, *29*(1), 145-153.

Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., Merriënboer, J., & Gog, T. (2017). Training

self-regulated learning skills with video modeling examples: Do task-selection skills transfer? *Instructional Science, 46*, 273–290. doi:10.1007/s11251-017-9434-0

Rubenstein, L. D., Callan, G. L., & Ridgley, L. M. (2018). Anchoring the creative process within a self-regulated learning framework: Inspiring assessment methods and future research. *Educational Psychology Review, 30*, 921–945.

Sanders, S., Losinski, M., Parks Ennis, R., White, W., Teagarden, J., & Lane, J. (2019). A meta-analysis of Self-Regulated Strategy Development reading interventions to improve the reading comprehension of students with disabilities. *Reading & Writing Quarterly, 35*(4), 339–353.

Schnackenberg, H. L., & Sullivan, H. J. (2000). Learner control over full and lean computer-based instruction under differing ability levels. *Educational Technology Research and Development, 48*(2), 19-35. doi:10.1007/BF02313399

Schworm, S., & Gruber, H. (2012). e-Learning in universities: Supporting help-seeking processes by instructional prompts. *British Journal of Educational Technology*, *43*(2), 272–281. https://doi-org.dist.lib.usu.edu/10.1111/j.1467-8535.2011.01176.x

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education*, *55*(4), 1721–1731. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2010.07.017

Sitzmann, T., & Johnson, S.K. (2012). The best laid plans: Examining the conditions under which a planning intervention improves learning and reduces attrition. Journal of Applied Psychology, (97)5, 967–981. doi:10.1037/a0027977

So, W. W. M., Chen, Y., & Wan, Z. H. (2019). Multimedia e-learning and self-regulated science

learning: A study of primary school learners' experiences and perceptions. *Journal of Science Education and Technology*, *28*(5), 508–522. https://doi-org.dist.lib.usu.edu/10.1007/s10956-019-09782-y

Sonnenberg, C., & Bannert, M. (2019). Using process mining to examine the sustainability of instructional support: How stable are the effects of metacognitive prompting on self-regulatory behavior? *Computers in Human Behavior*, *96*, 259–272. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2018.06.003

Theunissen, N., & Stubbé, H. (2014). iSELF: The development of an internet-tool for self-evaluation and learner feedback. *Electronic Journal of E-Learning*, *12*(4), 313–325.

Thibodeaux, T., & Harapnuik, D. (2020). Exploring students' use of feedback to take ownership and deepen learning in an online program. *International Journal on E -Learning*, *19*(1), 65–88.

Thiede, K. W., & de Bruin, A. B. H. (2018). *Self-regulated learning in reading*. In D. H. Schunk & J. A. Greene (Eds.), *Educational psychology handbook series. Handbook of self-regulation of learning and performance* (p. 124–137). Routledge/Taylor & Francis Group.

Tsai, C.W. (2013a). An effective online teaching method: the combination of collaborative learning with initiation and self-regulation learning with feedback. *Behaviour & Information Technology*, *32*(7), 712–723. https://doi-org.dist.lib.usu.edu/10.1080/0144929X.2012.667441

Tsai, C. W. (2013b). How to involve students in an online course: A redesigned online pedagogy of collaborative learning and self-regulated learning. *International Journal of Distance Education Technologies*, *11*(3), 47–57.

https://doi-org.dist.lib.usu.edu/10.4018/jdet.2013070104

Tsai, C. W. (2014). A quasi-experimental study of a blended course integrated with refined web-mediated pedagogy of collaborative learning and self-regulated learning. *Interactive Learning Environments*, *22*(6), 737–751. https://doi-org.dist.lib.usu.edu/10.1080/10494820.2012.745422

Tsai, C. W., Lee, T. H., & Shen, P.D. (2013). Developing long-term computing skills among low-achieving students via web-enabled problem-based learning and self-regulated learning. *Innovations in Education and Teaching International*, *50*(2), 121–132.

United Nations Educational, Scientific and Cultural Organization (2020). UNESCO rallies international organizations, civil society and private sector partners in a broad coalition to ensure #LearningNeverStops [WWW Document]. https://en.unesco.org/news/unesco-rallies-international-organizations-civil-society-and-private-sector-partners-broad (accessed 4-18-21).

Uzir, N. A., Gašević, D., Matcha, W., Jovanović, J., & Pardo, A. (2020). Analytics of time management strategies in a flipped classroom. *Journal of Computer Assisted Learning*, *36*(1), 70–88. https://doi-org.dist.lib.usu.edu/10.1111/jcal.12392

Uzun, A. M., Unal, E., & Yamac, A. (2013). Service teachers' academic achievements in online distance education: The roles of online self-regulation and attitudes. *Turkish Online Journal of Distance Education (TOJDE)*, *14*(2), 131–140.

van den Boom, G., Paas, F., van Merriënboer, J. J. G. & van Gog, T. (2004). Reflection prompts and tutor feedback in a web-based learning environment: effects on students' self-regulated learning competence. *Computers in Human Behavior*, *20*(4), 551–567. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2003.10.001

Vanslambrouck, S., Zhu, C., Pynoo, B., Lombaerts, K., Tondeur, J., & Scherer, R. (2019). A latent profile analysis of adult students' online self-regulation in blended learning environments. *Computers in Human Behavior*, *99*, 126–136. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2019.05.021

Wang, S. L., & Hong, H. T. (2018). The roles of collective task value and collaborative behaviors in collaborative performance through collaborative creation in CSCL. *Educational Technology Research and Development*, *66*(4), 937–953. https://doi-org.dist.lib.usu.edu/10.1007/s11423-018-9593-y

Wang, S. L., & Wu, P. Y. (2008). The role of feedback and self-efficacy on web-based learning: The social cognitive perspective. *Computers & Education*, *51*(4), 1589–1598. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2008.03.004

Winters, F. I., & Azevedo, R. (2005). High-school students' regulation of learning during computer-based science inquiry. *Journal of Educational Computing Research*, *33*(2), 189–217. https://doi-org.dist.lib.usu.edu/10.2190/F7HM-9JN5-JUX8-4BM9

Wolters, C. A., Pintrich, P. R., & Karabenick, S. A. (2003). Assessing self-regulated learning. Paper presented at the Conference on Indicators of Positive Development: Definitions Measures, and Prospective Validity, March 12–13, 2003.

Wong, J., Baars, M., de Koning, B. B., & Paas, F. (2021). Examining the use of prompts to facilitate self-regulated learning in Massive Open Online Courses. *Computers in Human Behavior*, *115*, N.PAG. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2020.106596

Wong, J., Khalil, M., Baars, M., de Koning, B. B., & Paas, F. (2019). Exploring sequences of learner activities in relation to self-regulated learning in a massive open online course. *Computers & Education*, *140*.

https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2019.103595

Yeh, Y. C., Kwok, O. M., Chien, H. Y., Sweany, N. W., Baek, E., & McIntosh, W. A. (2019). How college students' achievement goal orientations predict their expected online learning outcome: The mediation roles of self-regulated learning strategies and supportive online learning behaviors. *Online Learning, 23*(4), 23–41.

Yen, N. L., Bakar, K. A., Roslan, S., Luan, W. S., & Abd Rahman, P. Z. M. (2005). Predictors of self-regulated learning in Malaysian smart schools. *International Education Journal*, *6*(3), 343–353.

Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: A meta-analysis. *Asia Pacific Education Review, 17*(2), 187-202. 10.1007/s12564-016-9426-9

Zimmerman, B. J. (2000) Attaining self-regulation: A social-cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation (pp. 13-39). San Diego, CA: Academic Press. doi:10.1016/B978-012109890-2/50030-5

Zou, X., & Zhang, X. (2013). Effect of different score reports of web-based formative test on students' self-regulated learning. *Computers & Education*, *66*, 54–63. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2013.02.016

Appendix A: References for the SEE Model Table

Adesope, O. O., Zhou, M., & Nesbit, J. C. (2015). Achievement goal orientations and self-reported study strategies as predictors of online studying activities. *Journal of Educational Computing Research*, *53*(3), 436–458. https://doi-org.dist.lib.usu.edu/10.1177/0735633115603989

Aleven, V. A. W. M. M., & Koedinger, K. R. (2002). An effective metacognitive strategy: learning by doing and explaining with a computer-based cognitive tutor. *Cognitive Science, 26*, 147-179. doi:10.1016/S0364-0213(02)00061-7.

Ambreen, M., Haqdad, A., & Saleem, W. A. (2016). Fostering self-regulated learning through distance education: A case study of M. Phil secondary teacher education program of Allama Iqbal Open University. *Turkish Online Journal of Distance Education*, *17*(3), 120-135.

An, Y., & Mindrila, D. (2020). Strategies and tools used for learner-centered instruction. *International Journal of Technology in Education and Science*, *4*(2), 133–143.

Andrade, M. S. (2014). Dialogue and structure: Enabling learner self-regulation in technology-enhanced learning environments. *European Educational Research Journal*, *13*(5), 563–574.

Atkinson, R. K. (2002). Optimizing learning from examples using animated pedagogical agents. *Journal of Educational Psychology, 94*, 416-427. doi:10.1037/ 0022-0663.94.2.416.

Awofeso, N., Hassan, M., & Hamidi, S. (2016). Individual and collaborative technology-mediated learning using question & answer online discussion forums – perceptions of Public Health learners in Dubai, UAE. *Open Learning*, *31*(1), 54–63. https://doi-org.dist.lib.usu.edu/10.1080/02680513.2015.1120662

Bosman, L., Roy, S., McDonald, W., & Ababei, C. (2020). Using online discussions to connect theory and practice in core engineering undergraduate courses. *Computer Applications in Engineering Education*, *28*(3), 675–691. https://doi-org.dist.lib.usu.edu/10.1002/cae.22238

Chang, C. C., Tseng, K. H., Liang, C., & Liao, Y. M. (2013). Constructing and evaluating online goal-setting mechanisms in web-based portfolio assessment system for facilitating self-regulated learning. *Computers & Education*, *69*, 237–249. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2013.07.016

Crippen, K. J., & Earl, B. L. (2007). The impact of web-based worked examples and self-explanation on performance, problem solving, and self-efficacy. *Computers & Education*, *49*(3), 809–821. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2005.11.018

Fung, C. Y., Abdullah, M. N. L. Y., & Hashim, S. (2019). Improving self-regulated learning through personalized weekly e-Learning journals: A time series quasi-experimental study. *E-Journal of Business Education and Scholarship of Teaching*, *13*(1), 30–45.

Garcia, C., & Privado, J. (2020). Predicting cooperative work satisfaction of autonomous groups using a wiki tool in higher education. *Interactive Learning Environments*. https://doi-org.dist.lib.usu.edu/10.1080/10494820.2020.1764590

Handoko, E., Gronseth, S. L., McNeil, S. G., Bonk, C. J., & Robin, B. R. (2019). Goal Setting and MOOC Completion: A Study on the Role of Self-Regulated Learning in Student Performance in Massive Open Online Courses. *International Review of Research in Open & Distance Learning*, *20*(3), 39–58. https://doi-org.dist.lib.usu.edu/10.19173/irrodl.v20i4.4270

Harder, J. T., & Abuhamdieh, A. H. (2015). The role of positive regard in self-regulated learning: An analysis of student evaluation data. *Journal of College Teaching & Learning*, *12*(2), 109–120.

Harwood, C., & Koyama, D. (2020). Creating a virtual writing center to support self-regulated learning. *Studies in Self-Access Learning Journal*, *11*(3), 164–186. https://doi-org.dist.lib.usu.edu/10.37237/110306

Hiemstra, D., & Yperen, N. (2015). The effects of strength-based versus deficit-based self-regulated learning strategies on students' effort intentions. *Motivation & Emotion*, *39*(5), 656–668. https://doi-org.dist.lib.usu.edu/10.1007/s11031-015-9488-8

Hilbert, T. S., & Renkl, A. (2009). Learning how to use a computer-based concept mapping tool: self-explaining examples helps. *Computers in Human Behavior*, *25*(2), 267-274. doi:10.1016/j.chb.2008.12.006.

Hsu, Y. C., Ching, Y. H., Mathews, J. P., & Carr-Chellman, A. (2009). Undergraduate students' self-regulated learning experience in web-based learning environments. *Quarterly Review of Distance Education*, *10*(2), 109–251.

Hu, H., & Driscoll, M. P. (2013). Self-regulation in e-learning environments: A remedy for community college? *Educational Technology & Society*, *16*(4), 171–184.

Kahu, E. R., Stephens, C., Zepke, N., & Leach, L. (2014). Space and time to engage: Mature-aged distance students learn to fit study into their lives. *International Journal of Lifelong Education*, *33*(4), 523–540. https://doi-org.dist.lib.usu.edu/10.1080/02601370.2014.884177

Kasperiuniene, J., Zydziunaite, V., & Eriksson, M. (2017). Stroking the net whale: A constructivist grounded theory of self-regulated learning in virtual social

spaces. *Qualitative Research in Education*, *6*(3), 276–302.

Kauffman, D. F. (2004). Self-Regulated Learning in web-based environments: Instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs. *Journal of Educational Computing Research*, *30*(1/2), 139–161. https://doi-org.dist.lib.usu.edu/10.2190/AX2D-Y9VM-V7PX-0TAD

Kauffman, D. F., Zhao, R., & Yang, Y. S. (2011). Effects of online note taking formats and self-monitoring prompts on learning from online text: Using technology to enhance self-regulated learning. *Contemporary Educational Psychology*, *36*(4), 313–322.

Kim, K. J., & Frick, T. W. (2011). Changes in student motivation during online learning. *Journal of Educational Computing Research*, *44*(1), 1–23. https://doi-org.dist.lib.usu.edu/10.2190/EC.44.1.a

Kim, R., Olfman, L., Ryan, T., & Eryilmaz, E. (2014). Leveraging a personalized system to improve self-directed learning in online educational environments. *Computers & Education*, *70*, 150–160. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2013.08.006

Kostons, D., van Gog, T., & Paas, F. (2010). Self-assessment and task selection in learner-controlled instruction: Differences between effective and ineffective learners. *Computers & Education*, *54*(4), 932–940. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2009.09.025

Kostons, D., van Gog, T., & Paas, F. (2012). Training self-assessment and task-selection skills: A cognitive approach to improving self-regulated learning. *Learning and instruction, 22*(2), 121-132.

Kramarski, B., & Dudai, V. (2009). Group-metacognitive support for online inquiry in mathematics with differential self-questioning. *Journal of Educational Computing*

Research, *40*(4), 377–404.

Kramarski, B., & Gutman, M. (2006). How can self-regulated learning be supported in mathematical E-learning environments? *Journal of Computer Assisted Learning*, *22*(1), 24–33. https://doi-org.dist.lib.usu.edu/10.1111/j.1365-2729.2006.00157.x

Lee, H. W., Lim, K. Y., & Grabowski, B. L. (2010). Improving self-regulation, learning strategy use, and achievement with metacognitive feedback. *Educational Technology Research and Development, 58*(6), 629-648.

Lee, L. (2016). Autonomous learning through task-based instruction in fully online language courses. *Language Learning & Technology*, *20*(2), 81–97.

Lee, S., Barker, T., & Kumar, V. S. (2016). Effectiveness of a learner-directed model for e-learning. *Journal of Educational Technology & Society*, *19*(3), 221–233.

Lee, T. H., Shen, P. D., & Tsai, C. W. (2008). Enhancing computing skills of low-achieving students via e-learning: A design experiment of web-based, problem-based learning and self-regulated learning. *CyberPsychology & Behavior*, *11*(4), 431–436. https://doi-org.dist.lib.usu.edu/10.1089/cpb.2007.0080

Lehmann, T., Hähnlein, I., & Ifenthaler, D. (2014). Cognitive, metacognitive and motivational perspectives on preflection in self-regulated online learning. *Computers in Human Behavior*, *32*, 313–323. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2013.07.051

Lim, L. A., Gentili, S., Pardo, A., Kovanovic Ä., Whitelock-Wainwright, A., Gasevic, D., & Dawson, S. (2021). What changes, and for whom? A study of the impact of learning analytics-based process feedback in a large course. *Learning and Instruction, 72*. https://doi-org.dist.lib.usu.edu/10.1016/j.learninstruc.2019.04.003

Lin, J. W. (2018). Effects of an online team project-based learning environment with group

awareness and peer evaluation on socially shared regulation of learning and self-regulated learning. *Behaviour & Information Technology*, *37*(5), 445–461. https://doi-org.dist.lib.usu.edu/10.1080/0144929X.2018.1451558

Lin, J., Lai, Y., & Chang, L. (2016). Fostering self-regulated learning in a blended environment using group awareness and peer assistance as external scaffolds. *Journal of Computer Assisted Learning*, *32*(1), 77–93. https://doi-org.dist.lib.usu.edu/10.1111/jcal.12120

Lin, V., Liu, G. Z., & Chen, N. S. (2020). The effects of an augmented-reality ubiquitous writing application: A comparative pilot project for enhancing EFL writing instruction. *Computer Assisted Language Learning*. https://doi-org.dist.lib.usu.edu/10.1080/09588221.2020.1770291

McKenna, K., Pouska, B., Moraes, M. C., & Folkestad, J. E. (2019). Visual-form learning analytics: A tool for critical reflection and feedback. *Contemporary Educational Technology*, *10*(3), 214–228.

Mohammadi, P., & Araghi, S. M. (2013). The relationship between learners' self-directed learning readiness and their English for specific purposes course accomplishment at distance education in Iran. *Studies in Self-Access Learning Journal*, *4*(2), 73–84. https://doi-org.dist.lib.usu.edu/10.37237/040202

Montgomery, A. P., Mousavi, A., Carbonaro, M., Hayward, D. V., & Dunn, W. (2019). Using learning analytics to explore self-regulated learning in flipped blended learning music teacher education. *British Journal of Educational Technology*, *50*(1), 114–127. https://doi-org.dist.lib.usu.edu/10.1111/bjet.12590

Moos, D. C., & Azevedo, R. (2008). Monitoring, planning, and self-efficacy during learning with hypermedia: the impact of conceptual scaffolds. *Computers in Human Behavior*, *24*(4),

1686-1706. doi:10.1016/j.chb.2007.07.001.

Mou, T. Y. (2020). Students' evaluation of their experiences with project-based learning in a 3D design class. *Asia-Pacific Education Researcher*, *29*(2), 159–170.

Pilotti, M., Anderson, S., Hardy, P., Murphy, P., & Vincent, P. (2017). Factors related to cognitive, emotional, and behavioral engagement in the online asynchronous classroom. *International Journal of Teaching and Learning in Higher Education*, *29*(1), 145-153.

Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., Merriënboer, J., & Gog, T. (2017). Training self-regulated learning skills with video modeling examples: Do task-selection skills transfer? *Instructional Science, 46*, 273–290. doi:10.1007/s11251-017-9434-0

Rabin, E., Kalman, Y. M., & Kalz, M. (2019). An empirical investigation of the antecedents of learner-centered outcome measures in MOOCs. *International Journal of Educational Technology in Higher Education*, *16*(1). https://doi-org.dist.lib.usu.edu/10.1186/s41239-019-0144-3

Schnackenberg, H. L., & Sullivan, H. J. (2000). Learner control over full and lean computer-based instruction under differing ability levels. *Educational Technology Research and Development, 48*(2), 19-35. doi:10.1007/BF02313399

Schworm, S., & Gruber, H. (2012). e-Learning in universities: Supporting help-seeking processes by instructional prompts. *British Journal of Educational Technology*, *43*(2), 272–281. https://doi-org.dist.lib.usu.edu/10.1111/j.1467-8535.2011.01176.x

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education*, *55*(4), 1721–1731. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2010.07.017

Sitzmann, T., & Johnson, S.K. (2012). The best laid plans: Examining the conditions under which a planning intervention improves learning and reduces attrition. *Journal of Applied Psychology, (97)*5, 967–981. doi:10.1037/a0027977

So, W. W. M., Chen, Y., & Wan, Z. H. (2019). Multimedia e-learning and self-regulated science learning: A study of primary school learners' experiences and perceptions. *Journal of Science Education and Technology*, *28*(5), 508–522. https://doi-org.dist.lib.usu.edu/10.1007/s10956-019-09782-y

Sonnenberg, C., & Bannert, M. (2019). Using process mining to examine the sustainability of instructional support: How stable are the effects of metacognitive prompting on self-regulatory behavior? *Computers in Human Behavior*, *96*, 259–272. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2018.06.003

Theunissen, N., & Stubbé, H. (2014). iSELF: The development of an internet-tool for self-evaluation and learner feedback. *Electronic Journal of E-Learning*, *12*(4), 313–325.

Thibodeaux, T., & Harapnuik, D. (2020). Exploring students' use of feedback to take ownership and deepen learning in an online program. *International Journal on E -Learning*, *19*(1), 65–88.

Tsai, C.W. (2013a). An effective online teaching method: the combination of collaborative learning with initiation and self-regulation learning with feedback. *Behaviour & Information Technology*, *32*(7), 712–723. https://doi-org.dist.lib.usu.edu/10.1080/0144929X.2012.667441

Tsai, C. W. (2013b). How to involve students in an online course: A redesigned online pedagogy of collaborative learning and self-regulated learning. *International Journal of Distance Education Technologies*, *11*(3), 47–57.

https://doi-org.dist.lib.usu.edu/10.4018/jdet.2013070104

Tsai, C. W. (2014). A quasi-experimental study of a blended course integrated with refined web-mediated pedagogy of collaborative learning and self-regulated learning. *Interactive Learning Environments*, *22*(6), 737–751. https://doi-org.dist.lib.usu.edu/10.1080/10494820.2012.745422

Tsai, C. W., Lee, T. H., & Shen, P.D. (2013). Developing long-term computing skills among low-achieving students via web-enabled problem-based learning and self-regulated learning. *Innovations in Education and Teaching International*, *50*(2), 121–132.

Uzir, N. A., Gašević, D., Matcha, W., Jovanović, J., & Pardo, A. (2020). Analytics of time management strategies in a flipped classroom. *Journal of Computer Assisted Learning*, *36*(1), 70–88. https://doi-org.dist.lib.usu.edu/10.1111/jcal.12392

van den Boom, G., Paas, F., van Merriënboer, J. J. G. & van Gog, T. (2004). Reflection prompts and tutor feedback in a web-based learning environment: effects on students' self-regulated learning competence. *Computers in Human Behavior*, *20*(4), 551–567. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2003.10.001

Vanslambrouck, S., Zhu, C., Pynoo, B., Lombaerts, K., Tondeur, J., & Scherer, R. (2019). A latent profile analysis of adult students' online self-regulation in blended learning environments. *Computers in Human Behavior*, *99*, 126–136. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2019.05.021

Wang, S. L., & Hong, H. T. (2018). The roles of collective task value and collaborative behaviors in collaborative performance through collaborative creation in CSCL. *Educational Technology Research and Development*, *66*(4), 937–953. https://doi-org.dist.lib.usu.edu/10.1007/s11423-018-9593-y

Winters, F. I., & Azevedo, R. (2005). High-school students' regulation of learning during computer-based science inquiry. *Journal of Educational Computing Research*, *33*(2), 189–217. https://doi-org.dist.lib.usu.edu/10.2190/F7HM-9JN5-JUX8-4BM9

Wise, A. F., & Hsiao, Y. T. (2019). Self-regulation in online discussions: Aligning data streams to investigate relationships between speaking, listening, and task conditions. *Computers in Human Behavior*, *96*, 273–284. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2018.01.034

Wong, J., Baars, M., de Koning, B. B., & Paas, F. (2021). Examining the use of prompts to facilitate self-regulated learning in Massive Open Online Courses. *Computers in Human Behavior*, *115*, N.PAG. https://doi-org.dist.lib.usu.edu/10.1016/j.chb.2020.106596

Wong, J., Khalil, M., Baars, M., de Koning, B. B., & Paas, F. (2019). Exploring sequences of learner activities in relation to self-regulated learning in a massive open online course. *Computers & Education*, *140*. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2019.103595

Yen, N. L., Bakar, K. A., Roslan, S., Luan, W. S., & Abd Rahman, P. Z. M. (2005). Predictors of self-regulated learning in Malaysian smart schools. *International Education Journal*, *6*(3), 343–353.

Zheng, J., Li, S., & Lajoie, S. P. (2020). The role of achievement goals and self-regulated learning behaviors in clinical reasoning. *Technology, Knowledge & Learning*, *25*(3), 541–556. https://doi-org.dist.lib.usu.edu/10.1007/s10758-019-09420-x

Zheng, J., Xing, W., & Zhu, G. (2019). Examining sequential patterns of self- and socially shared regulation of STEM learning in a CSCL environment. *Computers & Education*, *136*, 34–48. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2019.03.005

Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: A meta-analysis. *Asia Pacific Education Review, 17*(2), 187-202. 10.1007/s12564-016-9426-9

Zou, X., & Zhang, X. (2013). Effect of different score reports of web-based formative test on students' self-regulated learning. *Computers & Education*, *66*, 54–63. https://doi-org.dist.lib.usu.edu/10.1016/j.compedu.2013.02.016

Reflection

My experience as an honors undergraduate at Utah State University has been unique in several ways. In addition to coming in as a transfer student, a world-wide pandemic was declared during my second semester here, causing the majority of my classes to be moved to online or blended learning environments. This, combined with moving up my graduation date for financial purposes, made the prospect of networking with professors, creating a Capstone project, and applying to graduate school (all while taking a full load of classes, serving in church, and working part time) seem extremely daunting. I honestly did not know where to begin, but I signed up for the Capstone prep-class and hoped for the best.

Originally, I thought that taking the Capstone prep class would easily allow me to come up with a spectacular original research project for my Capstone. Unfortunately for me, this was not the case. The further along we got in the semester, the more that spark of inspiration that I was so desperately looking for seemed to evade me. I even began contemplating whether it was worth it to stay in the Honors Program. However, before completely giving up, I decided to voice my concerns to Dr. Miller and see if she thought it would be possible to still accomplish a large project in a semester and a half. She assured me that it was, but prompted me to reach out to my Honors Department Advisor, Dr. Levin, as soon as possible, to brainstorm some ideas.

The meeting I had with Dr. Levin was one of a few critical turning points that I had during the Capstone process. After briefly listening to both my interests (I mentioned I had enjoyed working with children as a camp counselor) and my worries, she suggested a couple of raw project ideas, as well as a couple individuals to consider for the role of Capstone Mentor. One of those individuals was Dr. Callan, from the school psychology department. I emailed him with a project idea, asking if he would be willing to take me on with such little time left before I

graduated. He agreed, and after a couple meetings, helped me modify my Capstone plan to something that both sufficiently captured my interests and would be feasible to accomplish within a semester and a half.

One aspect of my project that made it possible to accomplish in such a short amount of time was the fact that it relied on previous research and was modeled after a systematic review that Dr. Callan had already completed. Had I chosen to not abandon my hopes of creating my own research study, I would almost certainly have needed an extra semester to get the necessary approval to conduct the experiments. However, even writing a systematic review in under six months was not an easy task. The process of finding empirical support for every single SRL practice was extremely long, tedious, and somewhat confusing. With all the other demands on my schedule, combined with some personal struggles I have been facing, I had trouble finding both the time and the motivation to complete the various tasks associated with the project. This led to me consistently missing the deadlines we set, which was embarrassing for me, seeing as I was used to being on top of everything. Again, I entertained thoughts of throwing in the towel. Then came the second pivotal moment during this project.

After observing my lack of substantial progress for a number of weeks, Dr. Callan decided it was time for him and Dr. Levin to intervene. We set up a meeting, which I fondly refer to as my "Come to Jesus" talk, where we discussed major roadblocks I was facing and potential solutions for them. What impressed me the most about that meeting was the fact that it was not a lecture. Instead of dwelling on my problem behaviors themselves, the focus was on the solutions moving forward. Furthermore, this meeting helped me realize the importance of the subject I was studying. Here I was, struggling to make it, and what was the solution? Implementing the very SRL practices I was researching into my own study routine.

There were several specific actions that Dr. Callan and Dr. Levin had me take moving forward after that meeting. First, they had me list out all the major tasks that still had to be performed and break them into smaller steps. Then they encouraged me to dedicate an hour in the morning and an hour in the evening every day and focus on just one or two of the tasks. Finally, they had me keep a personal record of when, where, and what I was studying, as well as whether I felt like my circumstances were conducive for learning. This part of the process was especially helpful for me, as it helped me easily pinpoint aspects of my study environment and other circumstances that were having an effect on my productivity. My observations then helped to inform some of my future actions. For example, I discovered (big surprise) that studying when I am hungry is relatively ineffective. Meanwhile, I also discovered that playing music while searching for articles made the process feel less monotonous. Most importantly, I made a connection between SRL practices and success. I realized that this positive rapport I had developed with my advisors (albeit undeserved), the help-seeking I had engaged in, their prompts and feedback, all of it was making a critical contribution to my success as a student.

Watching this intervention work wonders in my own life then caused me to consider the implications it could have for other online students feeling lost and confused. If SRL practices were able to help me get my life on track and accomplish tasks more efficiently, they would probably empower other struggling online students. Thus, I was even more motivated to continue the research. I am not sure at exactly what point I went from thinking "What is the point? Completing this project is a hopeless case." to "Hey, this is something I can accomplish and I see the value in the work I am doing.". What I do know is that implementing SRL practices into my study routine has had a gradual but nonetheless direct influence on the outcome.

To any future honors students who may end up reading this paper, I want you to know that it is natural to feel overwhelmed when contemplating a project as big as this Capstone. Do not feel bad if you are not the person who has already had your project idea in the back of your mind for the past two years. There are resources available to help you overcome your roadblocks and find a project that works (i.e. use the SRL practices you just read about). If you are still struggling, reach out to your Department Honors Advisor earlier rather than later. They can help you choose a project that meets your needs and interests. In the case of Dr. Levin, they can also be a much-needed source of encouragement.

Furthermore, do not compare your project to others. Yes, follow the guidelines set by the Honors department, and utilize the project examples to guide your efforts. But do not become overly fixated on how your project compares to others before. At the end of the day, comparison is the thief of joy. Everyone has unique interests and circumstances that influence what their projects shape out to be. It does not matter if you performed your own research study, presented a piece of creative work, or created a project that was implemented in an applied setting. If you complete the requirements for this project and learn something in the process, it is something to be pleased with.

Author Bio

Haley Hand is a transfer student at Utah State University, majoring in psychology and minoring in sociology. During her first year at Utah State, she completed a mentoring agreement while working as an After-School Club Leader at a local elementary school. It was this mentoring agreement (which involved the creation of a "psychology club" for third through fifth grade students) that ultimately sparked her interest in completing a capstone project based in school psychology. In addition to working with Dr. Callan on her Capstone this year, she also worked as an undergraduate research assistant in Dr. Odum's behavior analysis animal lab. After receiving her Bachelor of Arts at the end of this semester, she will be attending graduate school at Brigham Young University, where she will complete a three-year Education Specialist program to become a licensed school psychologist.