

Maximizing Learning Outcomes with the StSRL Framework

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Intellectual Merit. Self-regulated learning (SRL) is known to benefit students' learning and achievement. We carefully study the impact of our StSRL framework across multiple disciplines and learning environments to increase understanding of how best to support learners and instructors as they develop and implement SRL strategies. This project measures the impact of the framework and interventions on student achievement and retention across demographics in STEM. Data analytics from the bidirectional, real-time interventions contribute to understanding of the implementation of large-scale, technology-supported interventions. Rigorous study of instructors' use of the framework will inform and improve faculty professional development to serve as a model for scaling interventions. An interdisciplinary team of learning researchers and science faculty provide a combination of education theory expertise with discipline-based education research knowledge to contribute broadly to scholarly communities.

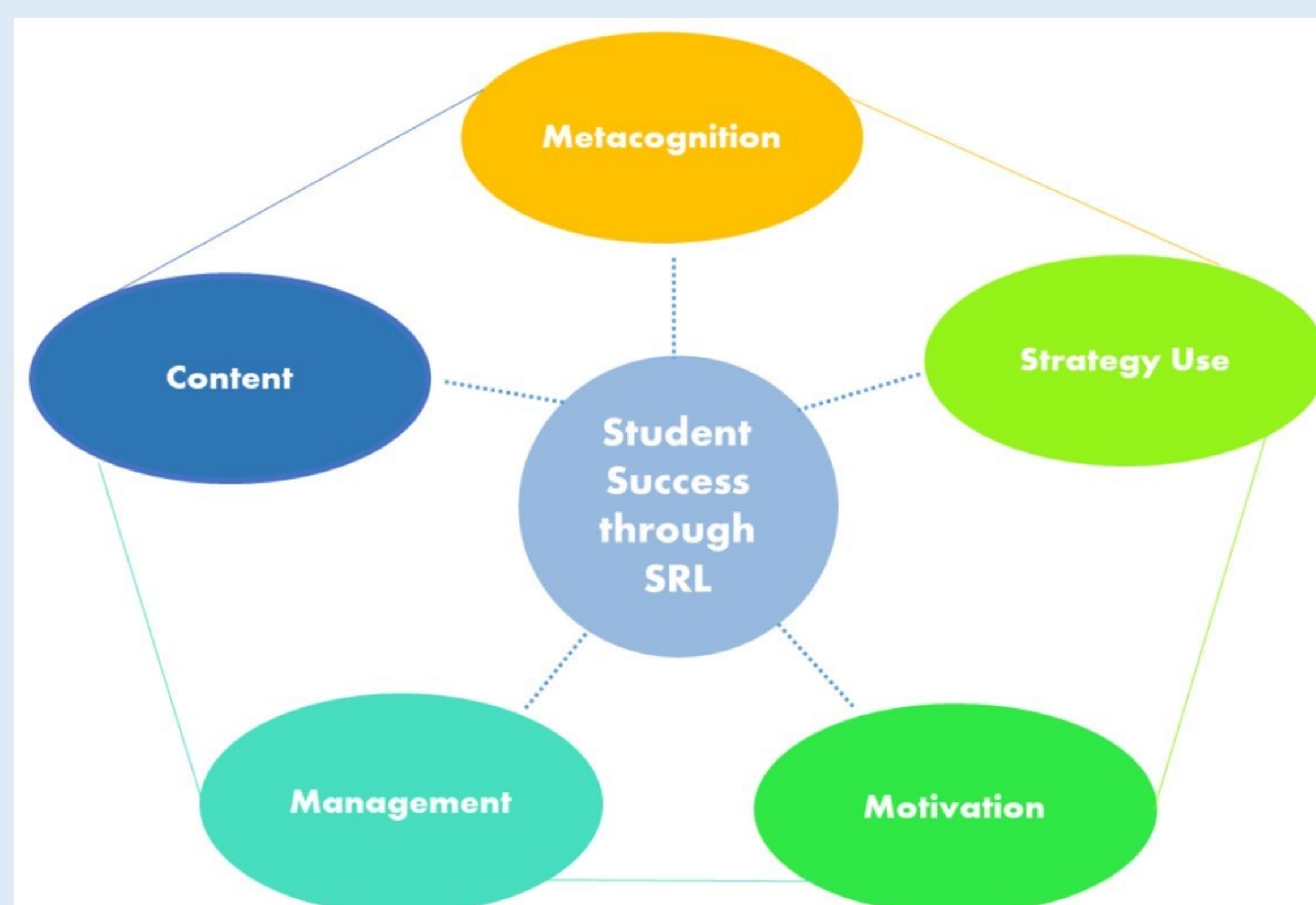
Example Nudges

Motivation	<ul style="list-style-type: none"> I know this is a busy weekend for many...please have a great time supporting THON if you are involved. On Monday we will be exploring the nephron in more detail, so you have something to look forward to! Don't forget to visit office hours to view your eTest #1. Looking what you got wrong and, more importantly, why you got it wrong can help you improve for the next test if that is a goal you have.
Metacognitive	<ul style="list-style-type: none"> Retrieval Practice is a powerful learning strategy. The more effort needed to retrieve, the stronger the connections found in your long-term memory. How could retrieval help you as you try to understand and apply the material presented in Chapter 3. What strategies are you already using or will use to help you prepare for Exam 1
Management	<ul style="list-style-type: none"> Have you made an appointment to visit the instructional team during office hours to discuss specific questions that you have? What method of note-taking are you using with Stat 200 "synchronous" Zoom lectures this semester
Cognitive Strategy	<ul style="list-style-type: none"> Compare and contrast skeletal and cardiac muscle. Consider structure, how each type is excited AND resultant action potentials. Compare and contrast the sympathetic vs. parasympathetic responses that may occur during the blood pressure reflex to help return blood pressure to its homeostatic level.
Content	<ul style="list-style-type: none"> Compare and contrast skeletal and cardiac muscle. Consider structure, how each type is excited AND resultant action potentials. Compare and contrast the sympathetic vs. parasympathetic responses that may occur during the blood pressure reflex to help return blood pressure to its homeostatic level.

Broader Impacts. Through successful optimization of the StSRL framework for interventions in undergraduate STEM courses, we directly impact students' self-regulated learning. Our preliminary findings support that this work has potential to significantly improve learning outcomes and retention across diverse disciplines and populations. This project provides a roadmap for deep collaborations among learning experts and science-content experts to drive advancement of evidence-based pedagogies in STEM contexts. Similarly, results from our work in biology and physics settings in this project are scaled to include other disciplines and, importantly, other populations, including learners enrolled in regional colleges, adult STEM learners in online settings, and underrepresented minority students participating in summer bridge programs. Results disseminated through scholarly outlets will inform STEM education audiences and provide access to the StSRL system for others' use across STEM learning contexts.

Four Overarching Objectives Drive this Project

1. Further test the impact of instructor and student use of the StSRL framework on SRL, self-efficacy, and achievement outcomes
2. Examine how differences in instructors' use of the framework inform intervention success
3. Test StSRL generalizability and scale up across STEM domains and learning contexts
4. Iteratively design and provide faculty professional development for SRL STEM interventions



The Success through SRL (StSRL) Framework. The StSRL framework utilizes the dynamic relations among five different components of SRL to support student learning and achievement within an instructional context.

	Year 1	Year 2	Year 3
Obj. 1 – Impact of use on student outcomes	-Descriptive analysis of existing and new student data from Biology	-Repeat descriptive analysis with new Biology and add Physics -Profile analysis	-Archival analysis of student retention using longitudinal StSRL data
Obj. 2 – Differences of instructor use on intervention success	-Descriptive and comparative analysis of existing and new instructor data from Biology and other disciplines	-SEM analysis -Confirmatory approach to replicate models with new Biology and Physics data	-Case study approach analyzing changes in instructor use over time
Obj. 3 – Scale and generalizability	-Survey and interview faculty that have attended StSRL professional development workshops to gather quantitative and qualitative baseline data of StSRL use	-Expand StSRL interventions to Biology and Physics courses at Commonwealth Campuses with subsequent analysis (see Obj. 1 & 2)	-Expand StSRL intervention to additional groups (adult, online learners and summer bridge program students) with subsequent analysis (Obj. 1 & 2)
Obj. 4 – Professional development for instructors	-Train recruited instructors targeted for Year 2 implementation -Create SRL FLC -Collect training assessment data	- Update training material based on Obj. 2 and assessment data from Year 1 -Recruit and train instructors targeted for Year 2 use -Collect training assessment data	- Update training material based on Obj. 2 and assessment data from Year 1 & 2 -Expand training to additional groups (see Obj. 3, Year 3) -Collect training assessment data

Dissemination Strategies

