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Abstract

Self-regulation is the control mechanism that enables a student to manage attention, emotion, behavior and cognition to engage in goal-directed actions, like learning. Too often, students at-risk for poor school outcomes do not enter school with strongly developed self-regulation skills and have difficulty developing them on their own. Self-regulation skills can be taught however, and are especially effective when introduced within the school setting. This manuscript describes a school based model for fostering self-regulation. We created the model within the Multi-Tiered Systems of Support (MTSS) framework, to facilitate successful implementation.

Keywords: self-regulation, multi-tiered system of support

Self-regulation, or the ability to regulate one's thinking, behavior and emotions, is critical for success in school (Galinsky, 2010). Self-regulation is the control mechanism that enables a student to manage attention, emotion, behavior and cognition to engage in goal-directed actions, like learning (Baumeister & Vohs, 2004; Calkins & Howse, 2004; Neuenschwander, Rothlisberger, Cimeli, & Roebbers, 2012). Both cognitive and behavioral regulatory processes are needed for effective self-regulation skills to navigate a formal learning environment or structured classroom setting. The cognitive components of self-regulation are thought to support processes necessary for knowledge acquisition, problem solving and other learning related tasks; whereas behavioral components of self-regulation are thought to support processes such as conforming to social rules and behavior norms in classroom contexts, and sustaining and regulating engagement and motivation, or regulating behavioral impulses (Neuenschwander et al., 2012).

Successful school functioning relies on a fully developed self-regulation capacity, but many students, particularly students with learning, attention, and social-emotional challenges, do not enter school with the requisite self-regulation abilities, and unfortunately, do not adequately develop them on their own. Exploring ways to promote self-regulation within the school context has the potential for a wide-ranging impact on students' ongoing socio-emotional and academic development (Flook et al., 2010). Academically when students are more self-regulated, they are able to work independently, process more efficiently, experience improved and more stable moods and behavior, have a stronger self-concept as a learner, and work in groups more flexibly and productively (Johnson & Clohessy, 2014).

Self-regulation is facilitated by the executive functions, which are needed internally—to control thoughts and feelings, externally—to meet the demands of the physical environment, and socially—to regulate behavior according to the expectations of others (Johnson & Clohessy, 2014). Executive functions involve a collection of interdependent, yet somewhat independent, processes involved in planning and executing regulated, goal-oriented tasks (Flook, et al., 2010). There is wide variability in the way in which executive functions are defined and the specific skills that have been identified as executive functions (Bageeta & Alexander, 2016). In general, executive functions can be thought of as the set of cognitive skills required to direct one's behavior to achieve a goal. The model of self-regulation used for this work includes the following six executive function skills:

- 1) Metacognition: Thinking about thinking; Keeping track of progress toward a goal; self-monitoring; recognizing the need for a strategy; evaluating the effectiveness of problem-solving.
- 2) Planning/Organizing: Goal setting and preparing; delineating steps to accomplish a goal; managing time; keeping belongings in order; arranging information; sequencing complex behaviors.
- 3) Initiating: Starting a task; engaging in a behavior in order to achieve a goal; beginning a thought process; interacting with others in order to start or maintain social relations.
- 4) Sustaining; Maintaining focus, effort, or attention; resisting distraction; continuing behavior or thought processes for prolonged periods of time.
- 5) Inhibiting: Controlling impulsive and negative behaviors; suppressing thoughts to prevent interrupting or blurting out answers; resisting a well-practiced response in favor of a new one.
- 6) Flexibility: Thinking about things from various perspectives; being open to new ways of doing things or solving problems; shifting easily from one activity to another; adapting to change (Johnson & Clohessy, 2014).

As described above, self-regulation is achieved through the use of these executive functions to control thoughts, feelings and behavior within one's self, in response to others, or within the environment (e.g. classroom). Therefore, student needs are understood both through the self-regulation framework (e.g. In what setting and in what ways is the student experiencing difficulty?) and through an assessment of their executive functions (e.g. Does the student have difficulty sustaining attention and effort or difficulty flexibly shifting from one learning task to the next?). This allows for the careful alignment of strategies to address a student's presenting needs.

Children who come from low income backgrounds tend to have greater difficulty with executive functions, effortful control and the regulation of emotions. The exposure to the chronic ecological stressors associated with low income has serious negative implications on children's ability to manage emotions, on the development of their higher order cognitive function, and on their behavior (Blair & Raver, 2012; Evans & English, 2002; Raver, 2012). Children experiencing lower levels of executive function and more difficulty with behavioral and emotional self-control have been found to be at greater risk for difficulty in educational contexts (Brock, Rimm-Kaufman, Natanson, & Grimm, 2009; Li-Grining, Vortuba-Drzal, Maldonado- Carreno, & Haas, 2010; Raver, 2002).

To address the needs of children from low income backgrounds, we developed a school-based model for fostering students' self-regulation skills. The self-regulation framework used to inform this model was developed at a center that provides psycho-educational evaluations, academic coaching and intervention and counseling support to students with learning and attention challenges. The model is situated within a multi-tiered systems of support (MTSS) framework, to focus on the importance of implementing strategies through a preventive approach (Mellard & Johnson, 2008). MTSS frameworks are consistent with public health models of intervention, in which the most efficient interventions are provided for all students, and more intensive supports are designed to meet the needs of students for whom primary prevention is insufficient to achieve successful outcomes. Many schools nationally have adopted MTSS frameworks to create a responsive system of academic and behavioral supports. Building on this established approach to implementation, we worked with staff at an elementary school in the Northwest serving a high percentage of students from low-income backgrounds, to include self-regulation strategies as an important component within the school's cohesive, responsive and inclusive system of services.

MTSS Framework

MTSS is defined as a continuum of research-based, system wide practices of data-based decision making used to meet the academic and behavior needs of all students (National Center on Response to Intervention, 2010). Within the MTSS framework, there is a focus on inclusive academic and behavior instruction that is driven by data-based decision making and supported by increasingly intensive tiers of support to meet the needs of all students. Although specifics of MTSS implementation can differ somewhat, in general, they include: 1) a multi-level prevention system, 2) screening, 3) progress monitoring, and 4) data-based decision making. Under the MTSS framework, schools improve their capacity to deliver effective and appropriate levels of intervention with a focus on preventive services. Derived from the public health model, the goal is to improve outcomes for *all* students and to develop a system that is responsive and able to provide early intervention.

Recent policy surveys indicate that all 50 states have either state-level policies or guidance documents that inform MTSS implementation. In surveys conducted to determine the number of schools and districts implementing MTSS models in academics (e.g. Response to Intervention), more than 70% of districts reported some level of implementation (Balu et al., 2015). For behavior (e.g. Positive Behavior Intervention Supports), more than 8,000 schools nationally reported some level of implementation, and that number continues to grow (Spaulding, Horner, May & Vincent, 2008). To leverage this familiar framework of service delivery and facilitate implementation, we situated the development of a self-regulation system of supports within the MTSS framework.

Self-Regulation Model

The school-based MTSS approach was informed by a model of self-regulation that reflects the complexity of the construct and depicts the ways in which self-regulation impacts students within the school setting (see Figure 1). The self-regulation model indicates the need for an individual to manage their thoughts, feelings and behavior in relation to their self, others and the environment. Specific examples and situations of the self-regulation activity that may be required across these contexts are included within Figure 1. Across all components of the model, executive functions are used to achieve self-regulation.

The components of the self-regulation model include: 1) *Self*, or internal self-regulation - the individual must regulate internal thoughts and feelings. Staying focused, applying an appropriate problem-solving strategy, and controlling negative feelings are all examples of internal self-regulation. 2) *Others*, or social self-regulation - social interaction is almost constant at school. Students must interact with peers, teachers, and parents in order to participate in the learning environment. Social self-regulation helps students build friendships. It also helps students ask for help from the teacher, complete a group project, and inform parents about what is happening at school. 3) *Environmental* self-regulation - students must also regulate to the demands of the physical environment. Keeping physical activity at a level appropriate for the situation, inhibiting negative behaviors, and resisting distractions are all part of this aspect of self-regulation. Across all three focus areas (self, others, environment), a student will need to regulate their *feelings*, *thoughts* and *behaviors* as needed to respond appropriately to the learning demands.

Developing a Responsive System of Self-Regulation Support

The school setting offers a conducive environment for developing self-regulation skills, because formal learning environments are highly structured and require self-regulation to be successful. To create a responsive system, we developed strategies for use within a multi-level prevention system, identified appropriate assessments and created a process for screening students in need of more intensive support, and selected progress monitoring instruments to inform the ongoing implementation of the work.

Multi-Level Prevention System

Tier One. Tier One self-regulation strategies are designed to be delivered in the classroom setting by the general education teacher. To develop Tier One strategies that could be easily articulated to teachers, we reviewed the evidence-based strategies that support self-regulation skill development and categorized them in ways that would be relevant for teachers, and that would promote understanding of the self-regulation framework to build their capacity to select and implement appropriate strategies. Through this process, we organized strategies in the following categories: 1) Self-monitoring strategies that allow children to improve meta-cognition, and marshal planning,

initiating and sustaining attention to the learning environment (Raver, 2012); 2) Movement and breathing strategies that leverage the growing research base suggesting that physical activity can positively impact specific executive functions, in particular inhibiting thoughts and behaviors that can interfere with learning, and promote greater flexibility (Barenberg, Berse & Dutke, 2011; Kraag, Zeegers, Kok, Hosman & Abu-Saad, 2006); and 3) Connection strategies that support a child's ability to become more flexible in their responses to changing situations and interactions with others, and to inhibit disruptive behaviors (Bailey, 2015; Woltering & Shi, 2016). Teachers learned how these strategies supported the executive functions, and how they might be applied and adapted depending on the situation. For example, the use of visual rubrics (Sam & AFIRM team, 2015) is a self-monitoring strategy that supports metacognition, and the rubrics can depict desired behaviors within the school environment (e.g. how the class should line up and walk to the library) and desired learning tasks that support self-regulation of thoughts (e.g. organizing their paper to take notes effectively).

Select examples of the strategies within each category, and the target area the strategies address within the self-regulation framework are included in Table 1. Many of the strategies address more than one area and more than one executive function. All of the strategies are brief and easy to implement, and designed to focus the students' attention on the importance of regulating thoughts, feelings and behaviors in ways that support learning. At the beginning of the school year, teachers attended a one-day workshop provided by the authors, during which they learned about the importance of self-regulation to academic success, and also learned how to integrate self-regulation strategies within their classrooms. Teachers were given a set of self-regulation strategy cards that were color-coded by category (e.g. self-monitoring, movement/breathing, connection), and included the primary focus of the strategy (e.g. environment, behaviors, inhibit), and a brief description of how to implement the strategy. This provided teachers with an easy reference system to support selection and implementation of these strategies.

To begin implementation teachers, in collaboration with the school counselor, identified areas of challenge they wanted to address in their classrooms. For example, one of the third grade teachers commented that her students tended to get very anxious before any testing situation, and as a result, their test performance was not consistent with the ability they displayed on lower stakes assignments. This teacher chose to implement a connection strategy – during which she validated the students' concerns about wanting to do well and also briefly reviewed how well they had done on prior classwork. Through this strategy, she helped students become aware of (metacognition) and name their feelings and concerns, and also modeled how to begin to change their thoughts to be more positive. She also implemented a movement/breathing strategy, lazy 8 breathing (Bailey, 2015) to calm and focus their attention, and to provide them with a tool they could use anytime they could feel their anxiety or stress begin to rise.

Another teacher commented that her students had significant difficulty getting ready for different aspects of the school day. This teacher selected the use of visual rubrics (Sam & AFIRM Team, 2015) that they created to illustrate what being prepared for different times of the day looked like, and then rated themselves on how well they did following the rubric. Visual rubrics became a powerful tool within this teacher's classroom. The visual reminder provided a cue for children who needed a prompt, and the evaluation of performance supported students' awareness of their actions.

Finally, one of the third grade teachers expressed concern about her students' inability to sustain attention and wanted to learn more efficient ways to provide movement breaks without disrupting instruction. She reported that currently, she would allow individual students the opportunity to move when needed, but the constant movement of a few students throughout the lesson made her class feel unfocused. This teacher scheduled intentional movement breaks, and included these on the daily schedule on the board so students would know that there were planned opportunities to move across the day.

Throughout the first semester of implementation, we checked in with teachers once each week to answer any questions they had about how to implement strategies and which strategies might be the most appropriate to address the needs of their children in the classroom. Additionally, the teacher who implemented visual rubrics in her classroom was experiencing significant success, and shared this with her team. Soon, nearly all teachers across the school worked with their students to develop visual rubrics for the various transitions and times during the day when students benefitted from having more guidance and structure.

Tier Two. The use of Tier One strategies in the classroom will support the needs of many students. However, even with Tier One strategies in place, there will likely be a smaller group of students whose difficulty regulating their thoughts, feelings and behavior will negatively impact school performance and will require more intensive

intervention. In our MTSS Self-Regulation framework, Tier Two strategies include small group counseling techniques using a cognitive behavioral therapy (CBT) approach. CBT asserts that a person must change the way they think before they can change the way they act. This is known as cognitive restructuring. Although the focus of small group counseling will vary somewhat depending on the needs of the students receiving Tier Two services, counseling centers around enabling students with more intensive self-regulation needs to regulate their thoughts, feelings and behavior in relation to themselves, others and within the environments in which they operate. A number of tools are used to help students develop coping skills, build on their strengths, improve cognitive flexibility, boost positive thinking and beliefs, manage stress and negative emotions, inhibit negative behaviors, and increase their social cognitive skills. These strategies help students change behavior, improve mood and enhance their social relationships. Within the school setting, the counselors from the learning center and the school counselor co-facilitates small group counseling once per week to small groups of between 3-6 students in grades three through five.

Tier Three. At this point in the development of our school-based, self-regulation model, we have not specified a within-school approach to Tier Three. Children with needs that cannot be addressed through Tier One or Two services do receive 1:1 support from the school-counselor, but this often includes referral to the appropriate community-based organization.

Universal Screening

Universal screening is conducted to identify students who may require more intensive support to develop self-regulation than can be provided in the classroom. The Student Risk Screening Scale-Internalizing and Externalizing (SRSS-IE; Lane, Menzies, et al., 2012), was completed by each teacher for their students. The SRSS-IE has been determined to be both psychometrically sound and socially valid for use at the elementary school level (Lane et al., 2012). Additionally, the SRSS-IE has been shown to be more effective than other screening tools in identifying students with either or both *internalizing* behaviors and *externalizing* behaviors. This information is important, as it better identifies the areas of need and informs grouping decisions and focus areas for Tier Two interventions.

Once the initial risk pool was identified with the SRSS-IE, teachers completed the Behavioral and Emotional Screening System (BESS; Kamphaus & Reynolds, 2007). The BESS is a standardized, norm-referenced tool designed to screen for externalizing, internalizing, school problem behaviors and adaptive skills in children and adolescents. The psychometric soundness of the BESS has been evaluated as strong both for reliability and validity (Jenkins et al., 2014). The data from the BESS teacher form was used to inform the prioritization of Tier Two services and the composition of the small groups to maximize the time spent on Tier Two counseling services.

Progress Monitoring

Tier One Progress Monitoring - Teacher Implementation Surveys. Teachers completed an online weekly survey that prompted them to reflect on their implementation of the self-regulation strategies. The survey is included in Figure 2. The data collected from these weekly surveys was compiled both at the teacher level and then across the grade levels. Discussion with the implementation team also allows teachers to share their experiences and to encourage each other to implement those that they find impactful.

Tier One Progress Monitoring - SRSS-IE. As described above, the SRSS-IE is used as a screening instrument, and children are screened every 8-9 weeks in the school-based model. As a progress monitoring tool, the repeated administration of the SRSS-IE provides feedback on the extent to which students continue to display the externalizing and internalizing behaviors measured by the scale.

Tier Two Progress Monitoring – Child Outcome Rating Scales (CORS) and Child Session Rating Scales (CSRS). The CORS and CSRS (Miller & Duncan, 2004) were developed as a means for young children and clinicians to obtain real time feedback to inform their treatment. The ORS is a simple, four item measure that is given after every counseling session. It is designed to assess: 1) personal or symptom distress; 2) interpersonal well-being; 3) social role, and 4) overall well being. These are four areas of life functioning known to change as a result of intervention. The CSRS was designed to give counselors feedback on the extent to which they and their students have developed what is called a therapeutic alliance – agreement on goals, agreement on tasks in therapy and emotional bond (Bordin, 1979). The CSRS is a four item measure designed to assess the client’s perceptions of: 1) respect and understanding; 2) relevance of the goals and topics; 3) client-practitioner fit; and 4) overall alliance (Low & Miller, 2017). Both the

CORS and the CSRS have been shown to demonstrate strong internal consistency and test-retest reliability (Campbell & Hemsley, 2009). These measures are used to provide formative feedback on the Tier Two counseling sessions, and data from these measures are managed through the myOutcomes.com system.

Data-Based Decision Making

Data-based decision making is a critical component of the MTSS framework. Through structured reviews and analysis of data, school teams make decisions about academic and behavioral interventions and their efficacy. Data is periodically reviewed during a planned team meeting that follows a standard format. Building on this process, we integrated the systematic review of the various self-regulation data described in the screening and progress monitoring sections above. Specifically, data from the CORS and CSRS informs the counselors about the well-being of the students in the small groups as well as the health of the therapeutic alliances between the students and the counselors, allowing the counselors to adjust implementation of the groups to best meet the needs of the students.

At the classroom level, teachers reviewed the data from the surveys they completed to determine which strategies were most frequently implemented. Additionally, the discussion of implementation provides an opportunity for teachers to reflect on the response of the students to the strategies and the needs of the classroom. Data from the counseling feedback sessions informs the Tier Two interventions and allows counselors to make immediate adjustments to ensure they are reaching all of the students in small group. By leveraging an existing team meeting, self-regulation was successfully added as another component to the MTSS framework without requiring teachers to learn to work within a new system.

Conclusion

Self-regulation is a critical aspect of school functioning, but many students, especially those at-risk for poor school outcomes do not possess adequate self-regulation skills and need support to develop them. Self-regulation is a complex construct. The self-regulation framework that informed this school-based model indicates the need for an individual to manage their thoughts, feelings and behavior in relation to their self, others and the environment through the use of their executive functions. Creating a model of implementation consistent with the MTSS framework presents a feasible and effective way for teachers and school staff to address the self-regulation needs of their students using evidence-based strategies and data-based decision making. With the tools and resources we have compiled, the school will be able to continue its implementation of this self-regulation model to continue to serve the needs of their students.

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Table 1

Sample Activities and Related Self-Regulation and Executive Function Skill Targets

Self-Monitoring Strategies	S,O,E*	T,F,B*	Executive Function
Visual Rubrics - display the steps of a process or depict appropriate behaviors or actions as a guide for students	E, O	B	Metacognition
Goal Setting - a meta-cognitive strategy that helps students identify and reflection on target performances or behaviors	S	T	Metacognition, Planning/Organizing
Movement/Breathing Strategies	S, O, E	T, F, B	Executive Function
Boom-Squat - a movement strategy to energize students	E	B	Sustaining
Lazy-8 Breathing - a calming strategy	S	F, T	Inhibit, Flexibility
Drain Breathing - a calming and focusing strategy	S	T, F	Sustain, Inhibit
Connection Strategies**	S,O,E	T,F,B	Executive Function
Validation - letting students know you understand they are experiencing emotions	S, O	F	Metacognition
Noticing - a connection strategy that draws the child's attention to the behavior without shaming	S, O	B, F	Inhibit, Flexibility, Metacognition

Note: S - Self, O - Others, E - Environment; T - Thoughts, F - Feelings, B - Behavior

**Connection strategies are from Conscious Discipline

Self-Regulation Model

	Feelings	Thoughts	Behaviors
Others (Self-regulation to meet social expectations)	Controlling anger during a playground argument	Perspective taking - trying to understand another point of view	Not calling a classmate names, refrain from interrupting
Self (Internal self-regulation)	Managing anxiety before a test	Focusing during a lesson	Put distractors out of the way during learning
Environment (Self-regulation to meet external demands)	Recognizing frustration in a classroom environment	Maintain attention on the learning environment	Inhibiting behaviors that disrupt the class (e.g. not blurting out, raising hand)

1) Reflecting on the best *and* the most challenging moments you've had this week in the classroom, rate your use of self-monitoring strategies:

0	1	2	3
I did not use any self-monitoring strategies this week.	I minimally used self-monitoring strategies.	I made a conscious attempt to use them, but could have done more.	I used self-monitoring strategies as much as possible.

2) Please rate your daily use of movement strategies this week:

0	1	2	3
I did not facilitate any movement strategies.	I facilitated 1 <i>daily</i> movement strategy.	I facilitated 2 or 3 <i>daily</i> movement strategies.	I facilitated 4 or more <i>daily</i> movement strategies.

3) Please rate your use of breathing strategies this week:

0	1	2	3
We did not purposely use any breathing strategies.	We occasionally used breathing strategies.	Either me or students regularly used breathing strategies.	<i>Both</i> myself and my students regularly used breathing strategies.

4) Please rate your use of connection strategies (including jobs and rituals) this week:

0	1	2	3
We are not using classroom connection strategies.	I used three or less connection strategies this week.	I used three to five connection strategies this week.	I used five or more connection strategies this week.

5) Please rate your confidence in using self-regulation strategies in your classroom:

0	1	2	3
I'm feeling discouraged; I'm not sure how to implement these, don't have time, or they don't seem to be working.	I feel so-so. They seem to be helping a bit, but I could use some support.	I feel pretty good; I'm able to implement many strategies and can see their benefit.	I feel great! These tools are helping my students feel calm, engaged, and connected.