Current Practice ALERTS

Sponsored by: Division for Learning Disabilities (DLD) and Division for Research (DR) of the Council for Exceptional Children

A focus on: **Self-Monitoring**

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What Is It?

As an introduction to self-monitoring, consider this scenario:

Ms. Fullard notices many students in her inclusive 4th-grade classroom, and especially those with learning disabilities (LD), have difficulty managing their behavior and achieving to their full potential. For example, in math, Tim often gets up during seatwork time and wanders around the room and Lauren frequently answers problems incorrectly due to carelessness. Ms. Fullard does her best to help her students, but she just can't monitor all of them carefully all of the time. She really wants her students to learn how to regulate their own behavior.

Self-regulation, or managing one's own behavior, is critical for success in and out of school (Cleary, 2015). Self-regulation involves skills such as goal setting, self-instruction, self-monitoring, and self-reinforcement. Although each aspect of self-regulation is important, self-monitoring has particularly strong support for improving student outcomes in the research literature. Self-monitoring involves two components: *self-assessment* (evaluating the presence or frequency of a target behavior) and *self-recording* (documenting one's self-assessment).

Self-monitoring typically focuses on attention (*self-monitoring of attention,* or SMA) or performance (*self-monitoring of performance,* or SMP). Although many components of SMA and SMP are similar, they differ in a few specific ways. With SMA, students self-assess whether they are paying attention to the task at hand ("Am I focused right now?") on a preset schedule (e.g., every three minutes) and self-record after each interval. With SMP, students self-assess a particular aspect of their work, such as productivity (e.g., number of problems completed), accuracy (e.g., percent of answers correct), or strategy use (e.g., steps completed). Self-recording for SMP can occur during or after task completion.

Based on Ms. Fullard's observations of her students, she decides to use SMA with Tim and SMP with Lauren. For Tim, SMA is implemented during seatwork time in math and involves his cell phone vibrating every two minutes as a cue for him to self-assess his on-task behavior. Tim self-records his data on a recording sheet Ms. Fullard tapes inside his math folder each morning (see Figure 1 on page 2). For Lauren, SMP occurs at the end of math class each day. Ms. Fullard gives Lauren the answer key to the day's practice problems and she self-assesses her accuracy. Lauren self-records and graphs her data on a recording sheet Ms. Fullard gives her at the beginning of each week (see Figure 2, on page 3).

For Whom Is It Intended?

Self-monitoring can benefit learners across grade levels (pre-k through 12th grade) with and without disabilities who need support regulating their behavior. In particular, self-monitoring addresses common characteristics of students with LD, like Tim and Lauren, who often experience difficulties with executive function and self-regulation, as well as engagement, attention, academic performance, and strategy use (Butler & Schnellert, 2015).

How Does It Work?

Reid (1996) noted self-monitoring was initially used as a non-intrusive assessment technique. However, clinicians found it not only measured—but actually improved—the behavior being monitored, likely do to reactivity (i.e., awareness that the behavior

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is being assessed). Although the specific steps for implementing self-monitoring vary slightly across sources, we gleaned the following general guidelines from the literature.

Step 1: Identify and operationally define the target behavior. The first step with self-monitoring is to identify an important, problematic behavior (e.g., Tim is frequently off-task during seatwork time in math). Then, a positively-phrased replacement behavior is generated (e.g., on-task) and operationalized in observable, measurable terms (e.g., Tim will stay seated, work on his assigned math problems, and raise his hand if he has a question). For additional information about defining a target behavior, see Bicard, Bicard, and the IRIS Center (2013).

Because self-monitoring helps a student engage in behaviors that are already within his or her repertoire—rather than acquire or learn new skills—it is essential the target behavior be something a student can do independently. For example, self-monitoring will not teach Lauren her multiplication facts, but it will help her solve multiplication problems to the best of her current ability. Additionally, self-monitoring works best with target behaviors that occur frequently and are readily observable.

Step 2: Design data collection procedures and collect baseline data. The type of data collected for self-monitoring depends on the target behavior. Frequency data (counting the number of times a behavior occurs) are often used with SMP. This can be done by tallying frequencies on a permanent product after a task is completed (e.g., the number of practice problems Lauren solved correctly) or tracking frequency during a task (e.g., the number of times Lauren raises her hand to ask for help during math class). An important consideration when using frequency data is comparability over time. Specifically, if a student's opportunity to engage in the target behavior varies across self-monitoring sessions (e.g., Lauren does not complete the same number of practice problems every day), the data should be converted to a percentage or rate *(as shown in Figure 2, on page 3)*. Momentary time sampling is typically used with SMA. Momentary time sampling involves assessing whether a target behavior is being performed when a cue is provided (e.g., audible beep from a timer, vibration from a cell phone). The appropriate length between cues—which is called the cue interval—depends on the duration and frequency of the target behavior. When the target behavior occurs for a short period of time (e.g., a few seconds) and/or infrequently, the cue interval should be short (e.g., 30 seconds) to make sure the behavior is not missed. Longer cue intervals (e.g., 3 minutes) are appropriate for behaviors that are longer in duration and/or occur frequently. For example, because Tim is typically on-task for 3 to 4 minutes at a time, Ms. Fullard set 2 minutes as his initial cue interval.

GO for it

Once data collection procedures are established, the next step is to collect baseline data. The first purpose of baseline data is to confirm the target behavior is appropriate. For example, if Tim's baseline data revealed he was already on-task 90% of the time, Ms. Fullard would need to carefully reconsider her initial determination of what was problematic for him. The second purpose of baseline data is to provide critical information about a student's level of performance before self-monitoring is initiated, so a comparison can then be made with data collected during and after the intervention. Indeed, without baseline data, it is impossible for a teacher to reliably determine the effectiveness of self-monitoring for any individual student.

TIM

Date:

"Phone Call"	Am I on-task?	
#1	YES	NO
#2	YES	NO
#3	YES	NO
#4	YES	NO
#5	YES	NO
#6	YES	NO
#7	YES	NO
#8	YES	NO
#9	YES	NO
#10	YES	NO

FIGURE 1: RECORDING SHEET FOR TIM

FIGURE 1

Step 3: Design the intervention and prepare materials. Determining what materials and/or devices will be used for self-monitoring depends on whether the focus of the intervention is SMA or SMP, as well as other factors such as a student's age, developmental level, and personal preferences. With SMA, the type of cue must be selected. Traditionally, cassette players and headphones were used to provide audio cues; however, this was sometimes stigmatizing and could interfere with class participation. Modern technology such as smart phones, iPods, and tablets can now be used to inconspicuously deliver auditory, visual (e.g., flashing screen), and tactile (e.g., vibrating) cues. For example, Ms. Fullard used a tactile prompt (vibration) on a cell phone to cue Tim. Cueing is not typically used with SMP because self-assessment is done continuously or at a pre-determined end point.

For both SMA and SMP, a plan for self-recording must be established. With SMA, students typically use a recording sheet to indicate whether they are engaging in the target behavior at each cue. A wide variety of SMA recording sheets can be found online, or a teacher can create one—like Ms. Fullard did for Tim *(see Figure 1, above)*. Although self-recording with SMP can occur without a separate recording

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LAUREN **WEEK OF:**

Day	# of problems I practiced	# of problems I answered correctly	My Accuracy Rate!
Monday			%
Tuesday			%
Wednesday			%
Thursday			%
Friday			%

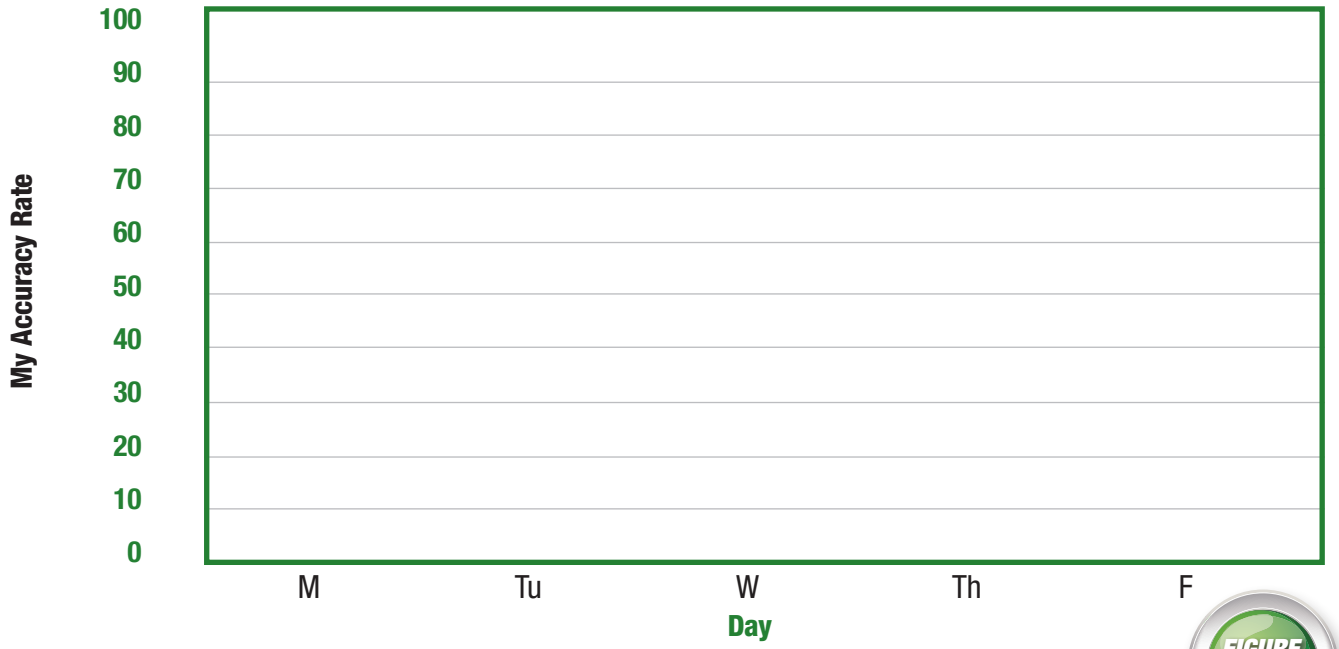

FIGURE 2

FIGURE 2. RECORDING SHEET FOR LAUREN

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sheet (e.g., Lauren could write her accuracy score directly on her practice problem worksheets), most teachers and students find they are beneficial, particularly for tracking performance over time. Sample SMP recording sheets are also readily available online, and Ms. Fullard created Lauren's self-recording sheet by combining the ideas she found in several different examples *(see Figure 2, above)*. With both SMA and SMP, mobile devices can be used to facilitate self-recording. For example, smart phone applications can cue students and enable self-recording directly into the device. The data are saved as an electronic file and can be easily shared (e.g., via email) and manipulated (e.g., graphed, printed).

Step 4: Introduce self-monitoring to the student and teach the procedures. Students must be taught how to self-monitor. To promote buy-in, the teacher usually starts by discussing the importance of the target behavior and the benefits of self-monitoring with the student. The teacher then provides explicit instruction that includes modeling, guided practice, and independent practice. First, the student is taught to identify the target behavior by, for example, (a) reviewing the operational definition with the teacher, (b) the teacher modeling examples and non-

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examples, (c) the student evaluating whether the teacher is engaging in the target behavior with teacher support, and (d) independently practicing identification of the target behavior until mastery is demonstrated (e.g., multiple and consecutive correct assessments). The entire process of self-monitoring is then discussed, modeled, and practiced—ideally in the setting where the strategy will be implemented—until mastery is demonstrated.

Step 5: Implement the intervention and monitor student progress. In this step, the student independently self-monitors. For example, Tim implements SMA by self-assessing his on-task behavior every two minutes when his cell phone vibrates and self-recording his data on the recording sheet. Lauren implements SMP by self-assessing the number of practice problems she solves correctly and self-recording her data on the recording sheet. Teachers should oversee students' self-monitoring to ensure the intervention is being implemented as intended and provide additional support, if needed (e.g., re-instruction, re-modeling). If a student's self-recorded data indicate self-monitoring is not producing the desired results, the intervention procedures can be intensified and/or extended by, for example, reducing the cue interval and/or adding other self-regulation components, such as goal-setting and self-reinforcement.

Step 6: Fading, maintenance, and generalization. The ultimate goal of self-monitoring is for students to self-regulate their behavior without external supports in a variety of settings. This is achieved by gradually fading the intervention and providing the necessary support for maintenance and generalization. Once a student shows consistent improvement on the target behavior as a result of implementing SMA or SMP, the intensity of the intervention should be carefully decreased. For example, over a period of three weeks, Ms. Fullard incrementally increased Tim's cue interval from 2 to 5 minutes. With Lauren, Ms. Fullard decreased the frequency of self-monitoring from daily, to every other day, and eventually once a week. While an intervention is being faded out, teachers should continue to carefully monitor the target behavior and take action if the data indicate regression. To promote generalization, teachers can create structured opportunities for a student to practice the target behavior in a different context (e.g., on-task behavior during seatwork time in *reading* for Tim; accuracy solving math *homework* problems for Lauren).

How Adequate is the Research Knowledge Base?

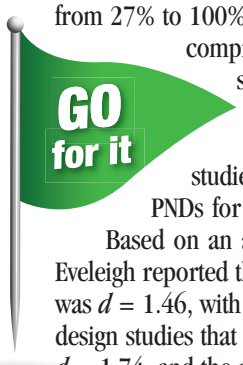
A substantial research base supports the effectiveness of self-monitoring for students with LD and related disabilities. In this section, we summarize five reviews that synthesized studies examining the effects of self-monitoring for students with LD.

Webber, Scheuermann, McCall, and Coleman (1993) identified 27 studies that examined the effects of self-monitoring on behavior change for students with learning and behavioral difficulties. Two studies used randomized group designs and 25 studies used single-case designs (SCDs). Results were not disaggregated by disability, but 35% of 142 total participants were reported to be students with LD. In 19 studies, the results were entirely positive; that is, self-monitoring was found to be effective across participants and outcome measures. The results in three studies were partially positive (i.e., self-monitoring was effective for some, but not all, outcomes), and the results in five studies were idiosyncratic (i.e., self-monitoring was effective for some, but not all, participants). Based on their review, Webber et al. concluded, "self-monitoring results in behavior changes for special education students" (p. 52).

Reid (1996) identified 23 studies (22 SCDs) published between 1974 and 1996 that examined the effects of self-monitoring as the sole intervention for students with LD. On-task behavior was the primary outcome measure in 21 studies and those results were unilaterally positive, regardless of grade level or instructional setting. The results for academic productivity were somewhat variable, but Reid found a pattern related to publication date. Whereas the earlier studies—such as those conducted in the 1970s—yielded equivocal results (possibly due to new content being introduced in the intervention phases), findings from the more recent investigations were consistently positive. Although the effect of self-monitoring on academic accuracy was only examined in two studies, the results from both were positive.

Anderson and Wheldall (2004) identified 44 studies (40 SCDs) published between 1991 and 2004 that examined the impact of self-monitoring on the behavior of students with disabilities. Although findings were not disaggregated for students with LD, 182 of 229 total participants were reported as having LD. On-task behavior was examined in 33 studies and self-monitoring was found to improve this outcome for 97% of participants. Academic productivity and accuracy were examined in fewer studies and the results were somewhat variable; however, Anderson and Wheldall's overall conclusion was self-monitoring "significantly increased productivity and accuracy for most students" (p. 57).

Joseph and Eveleigh (2011) reviewed 16 studies published between 1987 and 2008 that examined the impact of self-monitoring on reading outcomes for students with disabilities. The total number of participants was 302, of whom 182 were students with LD. Two effect size measures were computed to determine the effectiveness of self-monitoring: percentage of non-overlapping data (PND) for SCD studies and Cohen's *d* for group design studies. Scruggs, Mastropieri, and Castro (1987) interpreted PNDs >90% as large effects, 70%-90% as medium effects, and <70% as small effects. According to Cohen's (1988) broad guidelines, $d > 0.8$ is a large effect, $d > 0.5$ is a medium effect, and $d > 0.2$ is a small effect. Joseph and Eveleigh found the average PNDs for oral reading accuracy ranged from 27% to 100% (across four studies) and the range for reading comprehension accuracy was 82% to 95% (across four studies). Productivity on reading comprehension questions was measured in two studies and the average PNDs were 33% and 100%. For the three studies that included only students with LD, the average PNDs for accuracy measures ranged from 32% to 100%. Based on an analysis of six group design studies, Joseph and Eveleigh reported the average effect size for reading comprehension was $d = 1.46$, with the range being 0.42 to 2.79. For the four group design studies that included students with LD, the average effect was $d = 1.74$, and the range was 0.44 to 2.79. The authors summarized that self-monitoring techniques, "were not only found to be effective but were considered low cost and easy to implement across tasks …, genres …, content areas …, and settings" (p. 51).



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Finally, Fishley and Bedesem (2014) reviewed 14 studies that examined the effects of self-monitoring for students with high incidence disabilities, specifically in inclusive classrooms. The majority of studies were SCDs and, collectively, they included 14 students with LD, which was the largest number of participants from any disability category (results were not disaggregated by disability). The primary outcome measure in 10 studies was on on-task behavior, with the other assessed areas being strategy use, accuracy, and productivity (i.e., spelling and math). Based on their review, Fishley and Bedesem concluded self-monitoring leads to "largely positive outcomes" (p. 79), with only one student across all the studies not exhibiting improvement as a result of intervention.

How Practical Is Self-Monitoring?

Self-monitoring has become a go-to strategy for classroom teachers because it is (a) validated in multiple research studies as effective; (b) highly adaptable to a range of students, behaviors, and contexts; and (c) neither expensive, nor time-consuming to implement (Menzies, Lane, & Lee, 2009). Because self-monitoring is a student-directed approach, it requires less teacher time and effort than many other interventions. With advancements in technology, such as downloadable applications for smart phones and tablets, self-monitoring is even more efficient than it used to be (Bedesem, 2012; Bedesem & Dieker, 2014; Gulchak, 2008; Wills & Mason, 2014). Another advantage of self-monitoring is that it can be easily combined with other interventions and classroom management practices, and it often serves to enhance them. Given all the benefits of self-monitoring, it is probably not surprising to learn that both teachers and students generally rate it positively (Joseph & Eveleigh, 2011; Sheffield & Waller, 2010).

What Questions Remain?

Although research indicates self-monitoring has positive effects across a range of outcomes for students with LD and other disabilities, some questions still remain. For instance, researchers have not determined whether and how factors such as gender, age, socioeconomic status, or ethnicity impact the effectiveness of self-monitoring. Additional research is also needed to clarify whether and how long positive effects are maintained and generalized across settings. Finally, future research should explore the benefit of combining self-monitoring with other strategies, such as reinforcement, graphing, and function-based support.

How Do I Learn More?

We recommend these resources for educators who want to learn more about self-monitoring.

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About the Alert Series

Current Practice Alerts is a joint publication of the **Division for Learning Disabilities** and the **Division for Research of the Council for Exceptional Children**. The series is intended to provide an authoritative resource concerning the effectiveness of current practices intended for individuals with specific learning disabilities.

Each *Alerts* issue focuses on a single practice or family of practices that is widely used or discussed in the LD field. The *Alert* describes the target practice and provides a critical overview of the existing data regarding its effectiveness for individuals with learning disabilities. Practices judged by the Alerts Editorial Committee to be well validated and reliably used are featured under the rubric of **Go For It**. Those practices judged to have insufficient evidence of effectiveness are featured as **Use Caution**.

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