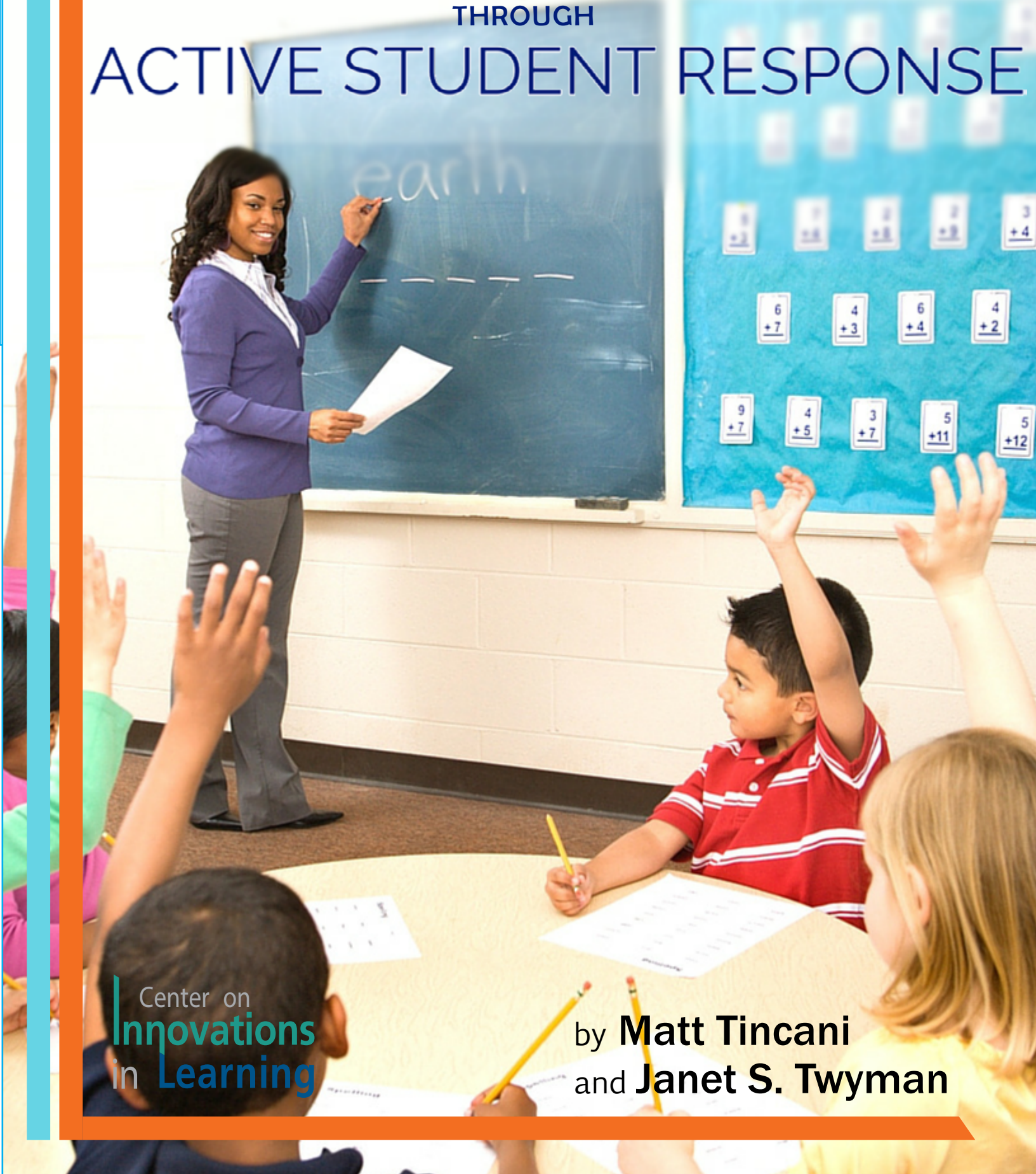


# ENHANCING ENGAGEMENT

THROUGH

# ACTIVE STUDENT RESPONSE



Center on  
**Innovations**  
in **Learning**

by **Matt Tincani**  
and **Janet S. Twyman**



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**Enhancing Engagement  
Through  
Active Student Response**

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**Janet S. Twyman**



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**M**alik is a sixth-grade student in Ms. Wilson’s math class at George Washington Carver Middle School. Like many of his classmates, Malik lives in a single-parent household with his mother, Andrea. Andrea hopes for a better future for Malik and has always encouraged him to do well in school. Malik excels in most subjects and this year he is doing exceptionally well in math; he loves geometry. While Malik’s aptitude for math and his mother’s encouragement are no doubt important factors in his success, Ms. Wilson’s teaching strategies also play a key role in his academic achievement.

At the beginning of each day’s class session, Ms. Wilson conducts a review of concepts from the previous class using write-on **response cards** (Randolph, 2007). Response cards allow Malik and his classmates to respond to Ms. Wilson’s questions simultaneously, increasing their active participation and engagement. They also provide her with ongoing feedback on their performance, which helps her target her teaching strategies accordingly. Next, as she reviews core concepts from the day’s lesson, students actively follow along with **guided notes** (Konrad, Joseph, & Eveleigh, 2009). Finally, she ends the class session with **peer tutoring** (Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003), in which students pair up to quiz each other with flash cards of geometry concepts. Collectively, these strategies promote high levels of **active student response** among Malik and his peers, with the goal of increasing their learning, retention, and academic achievement in core subjects like math.

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## Student Engagement and Active Student Responding

*One must learn by doing the thing; for though you think you know it, you have no certainty, until you try. —Sophocles*

**S**ophocles’s statement highlights a common-sense idea that most of us believe: Practice leads to mastery. Ask any skilled musician how she mastered her instrument and you will likely hear about long hours of practice over many years. As a general term, **student engagement** describes students’ motivation and opportunity to practice, and thus learn and master a particular skill. Student engagement is thought to be a product of many variables, including community factors such as socioeconomic status, early learning experiences, aptitude and interest in the subject matter, the school’s climate, and the quality of teaching and teacher interaction (Bloom, 1980; Finn & Zimmer, 2012; Skinner & Belmont, 1993). As educators, some of these variables are under our control (e.g., quality of teaching and teacher

interaction), while others are not immediately under our control (e.g., socioeconomic status). Clearly, as we seek to improve school quality and enhance students' academic achievement, it is fruitful to focus on the variables that we can change rather than to focus on the variables we cannot change. Some of these immediate solutions involve variables related to instructional quality. Classroom strategies that promote student engagement through active student response provide a direct means to improve quality of teaching to enhance student outcomes.

In his seminal chapter on low-tech strategies<sup>1</sup> for increasing **active student response** (ASR), Heward (1994) defines ASR as occurring “when a student emits a detectable response to ongoing instruction” (p. 286). In other words, ASR occurs when a student raises his hand, says an answer, writes an answer, or engages in some observable response following a teacher-posed question or other instructional cue. Heward contends that ASR is the best way to conceptualize student participation because it provides the most direct and observable measure of students' response to the curriculum. He contrasts ASR with other measures of student participation, such as allocated instructional time and time on-task, which yield less direct and meaningful measures of student performance. Heward details three low-tech strategies to increase ASR: choral responding, response cards, and guided notes. This practice guide will focus on these strategies, along with high-tech strategies, for increasing students' ASR and engagement with the curriculum.

## Enhancing Student Engagement Through ASR: Key Principles

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A substantial body of research indicates the positive relationship between students' active engagement with academic tasks and their achievement (see reviews by Ellis, Worthington, & Larkin, 1994; Greenwood, Delquadri, & Hall, 1984; Rosenshine, 2012). These studies indicate that, when teachers provide a high rate of opportunities for students to respond during instruction, the likelihood that students will be engaged is increased (Hattie, 2012; Rosenshine & Berliner, 1978). Increased engagement includes demonstrating more appropriate and on-task behaviors, and typically results in a greater number of correct responses (Simonsen, Fairbanks, Briesch, Myers & Sugai, 2008). When these positive student behaviors increase, it is less likely that students will have time to engage in inappropriate behaviors (Armendariz & Umbreit, 1999; Simonsen, Myers, & DeLuca, 2010).

Researchers have examined ways for increasing active student response through a variety of **high-ASR strategies** (Tincani, 2011). These strategies have been shown to demonstrate consistently high rates of ASR during small- or whole-group instruction and for diverse students, including those with disabilities and other special learning needs. Collectively, the research findings underscore four important principles for enhancing student engagement.

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<sup>1</sup> In this context, a low-tech strategy refers to any strategy that employs readily available materials and does not include digital equipment, devices, or software.



**ASR is an alterable variable.** As advocated above, it is more useful for educators to focus on variables that they can change than to dwell on those they cannot change. **Alterable variables** are instructional, curricular, or behavioral strategies within educators' control that, when changed, lead to measurable improvements in student engagement and performance (Bloom, 1980). For example, a school district may adopt a new, scientifically-based reading curriculum to improve students' reading performance. High-fidelity implementation of that curriculum is an alterable variable, one that can enhance students' acquisition of reading goals (see also Fixsen, Blase, Naoom, & Wallace, 2009). Similarly, school systems can take measures to adopt and sustain classroom-based, high-ASR strategies to improve students' academic and behavioral performance: A school district may adopt response cards to improve the math performance of fourth graders academically at risk due to learning and behavioral issues (Lambert, Cartledge, Heward, & Lo, 2006), as part of its school-wide positive behavior support (SWPBS) initiative (see below). If implemented correctly, both of these examples of alterable curricular and instructional modifications can lead to measurable performance improvements of diverse students.

**Teachers can increase ASR in their classrooms.** High-ASR strategies can be implemented system-wide; they are also readily available for teachers to improve student performance in their classrooms. Abundant research shows that teachers can easily implement high-ASR strategies—including response cards, choral responding, and guided notes (Haydon, Marsicano, & Scott, 2013; Jimenez, Lo, & Saunders, 2014; Randolph, 2007). This research also shows that high-ASR strategies increase students' classroom participation, on-task behavior, and correct responding in comparison to more traditional instructional methods. These strategies employ readily accessible instructional materials, can be used with existing lessons and curricula, and produce substantial improvements in performance of students who are less responsive to more traditional instructional methods.

**High-ASR strategies facilitate access to general education for students with disabilities.** The Individuals with Disabilities Education Act (IDEA) (2004) emphasizes the key role of inclusion and access to general education for students with disabilities. As students with disabilities progress through the general education curriculum, they are increasingly expected to participate in typical classroom environments characterized by large student-to-teacher ratios, group lessons, and rigorous academic content. Research shows that strategies like those mentioned above and discussed in detail below benefit students with learning disabilities, behavioral disorders, intellectual disabilities, and autism during typical group lessons (e.g., Haydon et al., 2013). High-ASR strategies are a means to facilitate students' access to the general education curriculum and inclusion in typical classroom arrangements. Such strategies enable students to participate more fully in small- and whole-group lessons that address general education curricular goals and which are commonplace in inclusive classrooms (e.g., Christie & Schuster, 2003; Swanson et al., 2012).

**Schools can create systems to facilitate high ASR.** SWPBS is a systems-level intervention to prevent challenging behavior and academic failure in schools. Implemented in over 20,000 elementary, middle, and high schools to date, SWPBS is particularly effective in addressing problems associated with at-risk and high-risk students (Bradshaw, Waasdorp, & Leaf, 2015). Consisting of three levels of preventative

action, the primary level of SWPBS prevention targets all students; secondary prevention targets students at risk for academic failure due to their challenging behavior; and tertiary intervention targets students with chronic, intensive challenging behavior. Consonant with SWPBS objectives, high-ASR strategies have been shown to reduce students' challenging behavior and improve their responsiveness to instruction. If implemented as part of a schoolwide intervention to improve academic and behavioral performance of all students, high-ASR strategies can be key components of primary prevention. If implemented in specific classrooms in which students display higher-than-normal levels of problem behavior, those strategies can be an effective secondary intervention. In either case, high-ASR strategies can be incorporated into SWPBS systems as a key component of prevention-based strategies.

## High-ASR Techniques

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**H**aving discussed the importance of alterable variables and the principles and benefits of high-ASR strategies, this guide will now explore four specific techniques referred to above for prompting high ASR. The four techniques are (a) response cards, (b) choral responding, (c) guided notes, and (d) peer tutoring. Each of the strategies is beneficial in increasing students' active responding, increasing their rates of correct response and response accuracy, and, in some cases, decreasing their challenging behavior.

### Response Cards

As the name suggests, response cards enable students to simultaneously answer teacher-posed questions by writing their answers with dry-erase markers, as in Figure 1, or by selecting the appropriate response from an array of choices, as in Figure 2 (Heward, 1994; Tincani, 2011). The first type of response cards, **write-on response cards**, can be made inexpensively by purchasing white paneling with a dry-erase surface from a home store and cutting it into individualized pieces. The second type of response cards, **pre-printed response cards**, can be made by printing an array of response choices on pieces of paper and then laminating them. Students may use an item like a clothespin to select the appropriate response from the choices printed on the front of the response card.

Research shows that, in a typical classroom of 30 students, when teachers call on students one at a time, each student will be actively participating for less than one minute per hour (Kagan & Kagan, 2009). Thus the format for the response cards is only part of what makes them an excellent strategy to promote high ASR. The essential feature of response cards is that the teacher asks a question, students write or select their response, and then they **simultaneously** hold up their cards so that the teacher can see each student's answer and provide feedback, typically to the whole group, or to individuals as needed. Hence, with one question a teacher can see the response of all students (and gauge learning) in much less time than it would take to call on each student individually. Response cards enable each student to make a response, in contrast to hand raising in which a few, some, or all students raise

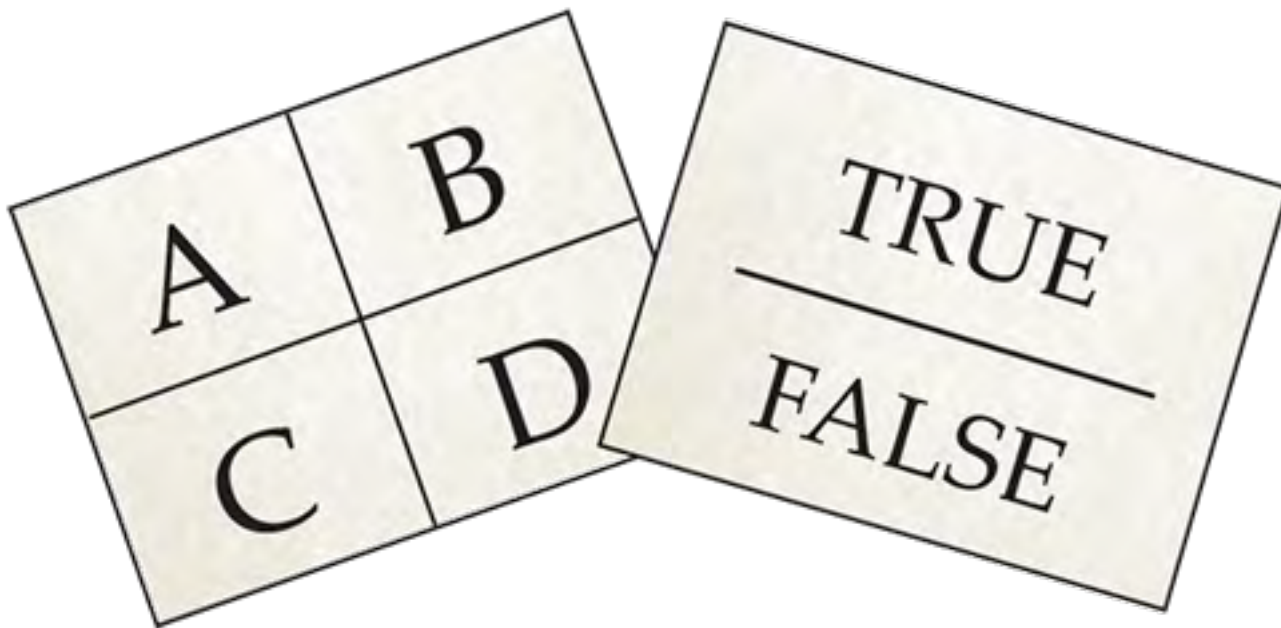
**Figure 1. An Example of Write-On Response Cards**

*Note.* Adapted with permission from Tincani, M. (2011). *Preventing challenging behavior in your classroom: Positive behavior support and effective classroom management*. Waco, TX: Prufrock Press.

their hands. Even if the teacher calls upon a number of students, it is unlikely that each student will be called upon, and any subsequent responses may be informed or influenced by earlier answers. Response cards not only enable higher rates of student responding, the simultaneous response format provides ongoing, formative feedback to the teacher about each student's performance, which can be used to evaluate students' understanding of curricular content and to adapt instruction accordingly.

Research has shown that response cards are effective in increasing students' active responding and positively impacts learning. Gardner, Heward, and Grossi (1994) found that the use of response cards during science instruction in a fifth-grade inner-city classroom resulted in 14 times higher active responding with response cards than with hand raising. Additionally, all 22 students scored higher on next-day quizzes and a review test that followed instruction with response cards than on assessments that covered facts and concepts taught with the hand-raising procedure. Positive outcomes have been seen across all grade levels and subject matter, including a meta-analysis showing statistically significant positive effect sizes for test scores, achievement, and participation (see Randolph, 2007), as well as a reduction in disruptive behavior (Randolph, 2007; Schnorr, Freeman-Green, & Test, 2015).

There appear to be many factors contributing to these outcomes. Response cards support the simultaneous responding of all students. When all students participate,

**Figure 2. An Example of Pre-printed Response Cards**

*Note.* Adapted with permission from Tincani, M. (2011). *Preventing challenging behavior in your classroom: Positive behavior support and effective classroom management*. Waco, TX: Prufrock Press.

their opportunities for active engagement increase. More opportunities to respond with feedback often results in increased correct responding. As noted by Heward, Courson and Narayan (1989), “Academic achievement is more likely to occur in classrooms in which students are actively engaged with instructional materials on which they have a high success rate” (p. 72). Additionally, most teachers are able to seamlessly include ASR within their teaching; the increased pace maintains student’s attention and interest in the content (Narayan, Heward, Gardner III, Courson, & Omness, 1990). When students are more actively responding they have fewer opportunities to engage in off-task and disruptive behaviors (Singer, Crosland, & Fogel, 2013).

Response cards can be used with a variety of curricular topics—math, reading, spelling, history, geography, science, and so forth—during small-group or whole-class lessons. Response cards are particularly useful during lessons in which the teacher asks a series of questions and students are expected to respond to each question as a group. Response cards follow a specific instructional format, as exemplified in Table 1: The teacher asks a question that requires a brief, discrete response (e.g., “In what year was the Bill of Rights ratified?”), then gives students sufficient time to formulate and write their responses, provides a clear cue for students to respond (e.g., “Cards up!”), and provides immediate feedback for the majority response (e.g., “Correct! Most of you got it; the Bill of Rights was ratified in 1791.”), and the teacher occasionally calls on individual students to verify the accuracy of their responses (Heward, 1994; Tincani, 2011). Table 1 contains sample teacher questions, student responses, and teacher feedback statements for use with response cards.

Importantly, response cards are most effective when implemented with **brisk instructional pacing**, the teacher moving through question–response–feedback sequences as quickly as possible but without hurrying the students. Research

suggests that teachers can easily attain response rates of approximately once per minute, and in some cases higher, as they implement high-ASR techniques. For example, Lambert et al. (2006) evaluated the use of response cards during math instruction of fourth-grade students in an urban elementary school. The study found that students' rate of academic responses increased from an average of 0.12 per minute with traditional single student responding to an average of 0.94 per minute with response cards. Students were able to maintain their accuracy with response cards even as their rates of academic responding increased by almost 80%. Brisk instructional pacing enables teachers to be more efficient instructors, increasing the number of practice opportunities they present during a given instructional time period (Tincani & Crozier, 2008). Brisk instructional pacing also can decrease challenging behavior because there is less down time for students to misbehave (Lambert et al., 2006; Tincani, Ernsbarger, Harrison, & Heward, 2005).

### Choral Responding

Choral responding is another high-ASR strategy that capitalizes on brisk instructional pacing to improve students' responsiveness to instruction. Choral responding occurs when students orally respond in unison to teacher-posed questions (Heward, 1994; Tincani, 2011). Like response cards, choral responding is effective during small- and whole-group lessons in which the teacher asks a series of questions that require brief responses from students, such as math facts, reading vocabulary, and spelling words. Choral responding has been effective in increasing students' active responding and decreasing their challenging behavior in comparison to more traditional response formats, such as raising hands (Haydon et al., 2013). Like response cards, positive effects of choral responding are likely a function of more opportunities for students to respond and teachers to offer feedback, coupled with fewer opportunities for student off-task behavior afforded by simultaneous student responding.

<b>Teacher's Question</b>	<b>Wait Time</b>	<b>Students' Response</b>	<b>Teacher's Feedback</b>
Writes "7x6" on the board.	→	42	"Well done. 42 is correct."
"Which Constitutional Amendment abolished slavery?"	→	The 13th Amendment	"Correct, the 13th Amendment."
"Spell drainage."	→	d-r-a-i-n-a-g-e	Yes, you got it, d-r-a-i-n-a-g-e.
"In which season do the leaves fall off trees?"	→	fall	"Right, fall is when trees go dormant and lose their leaves."
"What is the capitol of New Jersey?"	→	Trenton	"Excellent. Trenton is the capitol of New Jersey."

Choral responding follows an instructional format similar to that used with response cards (Heward, 1994; Tincani, 2011). The teacher asks a series of questions (e.g., “What is 12 times 11?”); in conjunction with an appropriate wait-time pause, uses a clear signal (e.g., “Tell me.”); and provides feedback for the majority group response (e.g., “Good, it’s 132!”). To confirm individual understanding, teachers may occasionally call on individual students, especially if he or she notices a student is more hesitant to respond, less certain of his or her response, or may have offered an incorrect response. Interspersing individual opportunities to respond within the flow of choral responding is particularly useful when individual responses cannot be heard, and may not only check for or confirm learning, but also reinforce new knowledge (such as calling on a student who had previously been incorrect but just heard the correct group response). Like response cards, choral responding is best implemented with brisk instructional pacing. In one study, Tincani et al. (2005) compared faster- and slower-paced teaching while delivering small-group instruction with the Direct Instruction Language for Learning program (Engelmann & Osborn, 2008), which uses choral responding. That study found that faster-paced instruction increased the students’ rate of participation and correct responding in comparison to slower-paced instruction.

### **Guided Notes**

Response cards and choral responding are useful strategies for group lessons that involve a teacher directly questioning students; however, many lessons require students to listen carefully to the teacher’s lecture and to take accurate notes. Efficient, accurate note taking is increasingly important as students progress through middle and high school; good note-taking skills are also essential for success in college. Regrettably, many students, particularly those with learning and other disabilities, are poor note takers (Boyle & Forchelli, 2014). Guided notes offer one way to improve the quality of students’ note taking while increasing their ASR and enhancing their academic performance.

According to Heward (1994), guided notes are “teacher-prepared handouts that guide a student through a lecture with standard cues and prepared space in which to write the key facts, concepts, and/or relationships” (p. 304). Guided notes are a high-ASR strategy because they create planned opportunities for student response during lectures. Like response cards, guided notes can be used with a wide range of academic subjects. To demonstrate this strategy’s utility, Haydon, Mancil, Kroeger, McLeskey, and Lin (2011) reviewed 13 studies that compared guided notes with traditional note taking for students across a variety of K–12 and college settings. They found that guided notes improved students’ scores on quizzes and tests, increased the accuracy of their notes, and increased student responses during lectures, and that students preferred guided notes in comparison to traditional note taking.

Guided notes are created using the following steps (see also Konrad, Joseph, & Itoi, 2011; Tincani, 2011), as exemplified in Figure 4. First, the teacher makes an outline of the lecture using a slide preparation/presentation program. The outline should contain consistent typographical cues, such as bullets, to draw students’ attention to salient points in the lecture; special cues (e.g., stars, bells) can be used



Figure 3. An Example of Guided Notes

### Lobes of the Brain

Directions: Complete the guided notes along with the teacher's lecture.

The **cerebral** \_\_\_\_\_ of the brain is comprised of \_\_\_\_\_ major lobes.

- \_\_\_\_\_ lobe:
  - o Carries out higher mental processes, such as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and planning.
  - o Because of their location at the \_\_\_\_\_ of the brain, they are most prone to \_\_\_\_\_.
- \_\_\_\_\_ lobe:
  - o Involved in processing \_\_\_\_\_ information.
  - o Enables higher-order \_\_\_\_\_ recognition, such as being able to remember faces.
- **Parietal lobe:**
  - o Processes sensory information related to \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- \_\_\_\_\_ lobe:
  - o Responsible for processing \_\_\_\_\_ from the \_\_\_\_\_.

\*\*\* Write-in each name of the brain's four lobes.



to draw students' attention to particularly important information. Then, to enable ASR, the teacher creates blank spaces in which students can write the missing information as they listen to the lecture. The blank spaces should allow for one- to three-word responses, and the location of the spaces should vary in an unpredictable pattern to keep students focused on note taking. Guided notes can be modified to allow for different kinds of responses (e.g., drawing pictures) or to incorporate graphic organizers to help students conceptualize the information (Konrad et al., 2011). For students who use portable technology such as laptops or tablet computers, guided notes can be made with form-creating programs that enable users to type requested information in blank spaces. Figure 4 contains an example page of guided notes for a lesson on brain anatomy.

### **Peer Tutoring**

Peer tutoring promotes high ASR by capitalizing on an existing classroom resource: the students. The essential features of peer tutoring include repeated opportunities for practice, regular and immediate feedback, systematic correction of errors, and data-based decision making (Bowman-Perrott et al., 2013; Greenwood, Carta, & Hall, 1988). With planning, peer tutoring can reduce teachers' work and serves as a valuable classroom management tool, productively engaging students in teaching each other. Peer tutoring is one of the most researched high-ASR strategies, with more than 40 years of studies demonstrating its effectiveness across a variety of academic content areas and age levels (Leung, 2015) and for students with and without disabilities (Bowman-Perrott et al., 2013).

Although there are many variations of peer tutoring (e.g., Robbins, 2011), class-wide peer tutoring (CWPT) is a well-established approach (Kamps, Barbetta, Leonard, & Delquadri, 1994). The following steps are typical in CWPT programs (see Bowman-Perrott, 2009). First, the teacher reviews and practices the CWPT procedures with the students. Then, the teacher pairs students into dyads for tutoring sessions. Tutoring sessions can occur daily or two or three times per week, and dyads can pair higher achieving with lower achieving students. Each student is given a folder of materials, including items such as cards for students to quiz each other and point sheets to track progress. To practice vocabulary, cards can contain words on one side and definitions on the other; to practice math, cards can contain math questions on one side and answers on the other. Students take turns quizzing one another, providing positive feedback and error correction to their partners as appropriate. Correct responses are recorded in the folder and items or problems which the student has mastered are recorded as new items are introduced.

In a variation of peer tutoring that enabled kindergarten students to teach one another basic reading skills, Van Norman and Wood (2008) examined a peer-tutoring program using a small, inexpensive recording device called the Mini-Me<sup>2</sup>, with six low-performing kindergarten students in an urban elementary school. Students were taught to quiz each other on reading vocabulary using cards with words printed on one side and the Mini-Me attached to the other. When pressed, the Mini-Me played

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<sup>2</sup> This technology is similar to that found on sound modules for recording short messages on greeting cards and may still be found online.



a prerecorded pronunciation of each word, enabling students who lacked reading proficiency to teach each other. For each vocabulary card, students asked, “What word?”, allowed their partner to respond, and then pressed the button to play the recorded word, providing feedback. Van Norman and Wood found that peer tutoring with the prerecorded words increased the accuracy of peer-tutor feedback compared to peer tutoring alone, and that most students’ word identification improved from pre-test to post-test.

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## High-Tech Strategies

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**T**his guide has now examined four well-researched high-ASR strategies to improve student engagement and academic achievement: response cards, choral responding, guided notes, and peer tutoring. Our discussion of ASR would not be complete without considering high-tech or digitally based strategies for promoting high ASR. Therefore, we will briefly turn our attention to additional, promising digitally supported approaches. Technology innovations, including smartphones and tablet-based computers, provide promising alternatives for enhancing ASR, in addition to the low-tech strategies we have discussed above. We will briefly explore the use of digital student response systems, smartphones, and tablet computers to increase student engagement.

### Student Response Systems

**Student response systems (SRSs)** are commercially available technologies that promote student engagement during small- or whole-class lessons. An SRS consists of a radio receiver for the teacher, a group of key pads or “clickers” for the students, and software installed on a computer that allows the teacher to incorporate the SRS into existing software applications (Stav, Nielsen, Hansen-Nygard, & Thorseth, 2010). An SRS enables students to simultaneously respond by selecting or typing their answers to teacher-posed questions on their clickers. For example, a teacher can present a lecture, accompanied by a computer slide presentation, and imbed SRS questions about the lecture into the presentation. As students simultaneously answer the teacher’s questions with their devices, the teacher instantly receives data on students’ responses, which can be used to provide immediate feedback to the students or to evaluate their instructional performances (e.g., accuracy, participation) following the lesson.

Although SRSs are a promising instructional technology, currently their efficacy in enhancing K–12 students’ participation and learning is less well researched than low-tech strategies (such as response cards) that also permit simultaneous student responding. The same instructional considerations that apply to low-tech strategies also apply to high-tech systems like SRSs. Specifically, the teacher should build in as many practice opportunities as possible, teach briskly, use clear response signals, and provide immediate feedback.

Smartphones and tablet computers have become ubiquitous and have myriad educational applications with the potential to enhance student engagement. Many

free and low-cost software applications are available to teach a wide variety of pre-academic, academic, and functional skills. For instance, a growing body of research supports the efficacy of portable technology devices fitted with specialized software to generate speech for children with autism spectrum disorder (Lorah, Parnell, Whitby, & Hantula, 2015). And recently, Twyman and Heward (2016) have indicated a number of software applications that directly support active student responding. A comprehensive review of ASR educational software applications and their use is beyond the scope of this practice guide, but interested readers may see future CIL publications or Mahon (2014) for guidance in selecting and using mobile devices and applications in the classroom.<sup>3</sup>

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## Supporting Student Engagement:

### What to Look For

**C**ollectively, we have examined strategies for enhancing student engagement, including four evidence-based strategies: response cards, choral responding, guided notes, and peer tutoring. Whether adopting one of these strategies or a different strategy, teachers and school administrators should look for the following key elements to support student engagement in classrooms.

#### Classroom Organization

Organization is the foundation of effective classroom management and student engagement. The high-ASR strategies discussed thus far require precise instructional techniques, including lessons with specific, pre-planned questions; response signaling; positive feedback; and error correction. A “shoot-from-the-hip” approach is insufficient to implement these high-ASR approaches with fidelity. Rather, a high level of classroom organization and planning is necessary for teachers to enhance student engagement with these or different techniques. The following elements should be expected in any classroom implementing high-ASR strategies (see also Tincani, 2011): (a) whole-class and individual student schedules, as appropriate; (b) in classrooms with teaching assistants, schedules that detail teacher’s and teaching assistant’s assignments and responsibilities for each classroom activity; (c) physical space, including desk arrangements, organized to minimize distraction and to promote on-task behavior; (d) clear, efficient activity transitions; and (e) lesson plans that detail all aspects of the lesson, including teacher instructions and instructional stimulus–response signals, instructional targets (i.e., correct versus incorrect responses), and positive and corrective feedback.

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<sup>3</sup> Research reviews suggest that supplemental educational technology applications generally produce modest gains in academic performance; however, results are variable, with some applications producing little measurable improvements in performance (e.g., Cheung & Slavin, 2013). Schools should exercise caution in adopting educational technology applications that lack specific high-quality research support.

## Whole-Class Participation

Whole-class participation means that *all* students in the class have frequent opportunities to respond to teacher-led or self-directed instruction. Traditional lessons, in which students' only mode of participation is raising hands, produce low levels of class participation because students can only respond one at a time when they are called on by the teacher. In contrast, response cards, choral responding, peer tutoring, guided notes, and certain technology-based strategies that employ simultaneous responding promote whole-class participation. When observing a classroom with whole-class participation, all students should be actively engaged and few, if any, should be off-task. Whole-class participation can be accomplished while teaching the entire class as a group, or while dividing the class into smaller groups or dyads (e.g., peer tutoring).

## High Rates of Active Student Responding

As demonstrated throughout this guide, research finds that high-ASR strategies have a number of tangible benefits for diverse students, including those with disabilities and other special learning needs. Benefits of high-ASR strategies include increases in students' active participation during instruction; increases in students' correct responding, including scores on quizzes and tests; and decreases in their challenging behavior (Randolph, 2007). With decreased opportunities for off-task and disruptive behaviors, students and teachers have increased opportunities to practice and master subject content. Studies of high-ASR teaching strategies reported that students commonly respond to lessons at a rate of about once per minute or higher (e.g., Lambert et al., 2006). Brisk instructional pacing with students responding at rates equal to or greater than once per minute allows for frequent practice opportunities and facilitates mastery of instructional content. With careful instructional planning, students can achieve high response rates with response cards, choral responding, guided notes, peer tutoring, and other instructional techniques.

## Teacher Feedback

Feedback provides information to students about the quality and accuracy of their responses. Most of the high-ASR strategies discussed in this guide share a common focus on high rates of student feedback. For example, with response cards, choral responding, and peer tutoring lessons, students receive positive or corrective feedback for each response they make. Frequent feedback—whether delivered verbally or in writing—is critical because it improves accuracy of students' responses, encourages participation, and discourages off-task and disruptive behaviors. Whenever possible, positive feedback—praise—should be behavior specific; that is, it should describe in specific terms the commended behavior (Tincani, 2011): “Nice job figuring out the answer to that problem.” Behavior-specific praise is an integral part of formative evaluation to assess students' ongoing responsiveness to instruction.

## Summative Evaluation

Summative evaluation involves assessing outcomes of an instructional program to determine its effectiveness. Summative evaluation is different than formative evaluation, which involves ongoing assessment of student progress for the purposes of frequent (i.e., daily, weekly) instructional decision making. Any strategy to promote student engagement should employ a summative evaluation feature to determine if the program is meeting its goals in improving academic and behavioral outcomes at classroom, grade, and schoolwide levels. Summative evaluation should include regular (i.e., weekly or monthly) review of classroom-level, grade-level, and/or school-level data on instructional outcomes.

As noted earlier, high-ASR strategies have been shown to increase students' participation and correct responding during instruction, to improve their performance on quizzes and tests, and to decrease challenging behavior (Haydon et al., 2013; Randolph, 2007). Therefore, it should be expected that high-ASR strategies would improve students' scores on curriculum-based assessments and result in fewer discipline problems as reflected in lower levels of disruptive behavior in the classroom and/or fewer discipline referrals.

## Systems Support

As discussed, strategies to promote student engagement can be incorporated into existing schoolwide initiatives, including SWPBS. Whether incorporated into existing initiatives or implemented as a stand-alone intervention, strategies to facilitate student engagement must be accompanied by necessary levels of systems support. Critical elements of systems support include (a) preparation time for teachers to plan and evaluate lessons to promote student engagement; (b) support for purchasing any materials, including technology, needed to implement high-ASR strategies; (c) support from grade-level or school-level committees and related services providers (e.g., school psychologists) to implement strategies with fidelity; and (d) ongoing professional development and training in evidence-based student engagement techniques. Professional development is especially needed because teachers can learn techniques to increase students' ASR with minimal levels of training (e.g., Bondy, 2015).

## Summary

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**S**tudent engagement is critical to academic success. High-ASR teaching techniques are an effective way to improve student engagement and are an important component of evidence-based practice. High-ASR teaching strategies accompany important assumptions: (a) ASR is an alterable variable, (b) teachers can increase ASR in their classrooms, (c) high-ASR strategies facilitate access to the general education curriculum for students with disabilities, and (d) schools can create systems to promote high-ASR techniques. Four high-ASR strategies with substantial empirical support are response cards, choral responding, guided notes, and peer tutoring. Response cards involve students simultaneously writing or selecting

a response and then holding up their card on cue from the teacher. Choral responding involves students vocally responding in unison to teacher-presented questions. Guided notes are teacher-prepared handouts that guide a student through a lecture with cues and spaces to write the key facts, concepts, and/or relationships. Peer tutoring is a collection of strategies that employ students as one-on-one teachers of academic content. Research suggests that these techniques not only increase the overall frequency of student responding, but also their correct responding, and in some cases, their accuracy on quizzes and tests, as well as decrease their challenging behavior. Digitally supported strategies, such as student response systems, are also promising techniques to increase student ASR. Key elements to look for in classrooms with high levels of student engagement are classroom organization, whole-class participation, high rates of ASR, teacher feedback, summative evaluation, and systems support.

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## References

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- Armendariz, F., & Umbreit, J. (1999). Using active responding to reduce disruptive behavior in a general education classroom. *Journal of Positive Behavior Interventions, 1*(3), 152–158.
- Bloom, B. S. (1980). The new direction in educational research: Alterable variables. *Journal of Negro Education, 49*(3), 337–349.
- Bondy, A. (2015). *The effects of response cards on active student responding with students with autism spectrum disorder and Down syndrome in a self-contained 1st–2nd grade classroom* (Unpublished master's thesis). Temple University, Philadelphia, PA.
- Bowman-Perrott, L. (2009). Classwide peer tutoring: An effective strategy for students with emotional and behavioral disorders. *Intervention in School and Clinic, 44*(5), 259–267.
- Bowman-Perrott, L., Davis, H., Vannest, K., Williams, L., Greenwood, C., & Parker, R. (2013). Academic benefits of peer tutoring: A meta-analytic review of single-case research. *School Psychology Review, 42*(1), 39–55.
- Boyle, J. R., & Forchelli, G. A. (2014). Differences in the note-taking skills of students with high achievement, average achievement, and learning disabilities. *Learning and Individual Differences, 35*, 9–14.
- Bradshaw, C. P., Waasdorp, T. E., & Leaf, P. J. (2015). Examining variation in the impact of school-wide positive behavioral interventions and supports: Findings from a randomized controlled effectiveness trial. *Journal of Educational Psychology, 107*(2), 546–557.
- Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K–12 classrooms: A meta-analysis. *Educational Research Review, 9*, 88–113.
- Christie, C. A., & Schuster, J. W. (2003). The effects of using response cards on student participation, academic achievement, and on-task behavior during whole-class, math instruction. *Journal of Behavioral Education, 12*, 147–165.

- Ellis, E. S., Worthington, L. A., & Larkin, M. J. (1994). *Executive summary of research synthesis on effective teaching principles and the design of quality tools for educators* (Technical Report No. 6). Eugene, OR: University of Oregon, National Center to Improve the Tools of Educators. Retrieved from <http://files.eric.ed.gov/fulltext/ED386854.pdf>
- Engelmann, S., & Osborn, J. (2008). *Language for learning*. Columbus, OH: SRA/McGraw-Hill.
- Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In C.L. Christenson, A. L. Reschly, & C. While (Eds.), *Handbook of research on student engagement* (pp. 97–131). New York, NY: Springer.
- Fixsen, D. L., Blase, K. A., Naoom, S. F., & Wallace, F. (2009). Core implementation components. *Research on Social Work Practice, 19*(5), 531–540.
- Gardner, R., Heward, W. L., & Grossi, T. A. (1994). Effects of response cards on student participation and academic achievement: A systematic replication with inner-city students during whole-class science instruction. *Journal of Applied Behavior Analysis, 27*(1), 63–71. doi:10.1177/10983007060080020701
- Greenwood, C. R., Carta, J. J., & Hall, R. V. (1988). The use of peer tutoring strategies in classroom management and educational instruction. *School Psychology Review, 17*(2), 258–275.
- Greenwood, C. R., Delquadri, J., & Hall, R. V. (1984). Opportunity to respond and student academic achievement. In W. L. Heward, T. E. Heron, D. S. Hill, & J. Trap-Porter (Eds.), *Focus on Behavior Analysis in Education* (pp. 58–88). Columbus, OH: Merrill.
- Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. New York, NY: Routledge.
- Haydon, T., Mancil, G. R., Kroeger, S. D., McLeskey, J., & Lin, W. Y. J. (2011). A review of the effectiveness of guided notes for students who struggle learning academic content. *Preventing School Failure: Alternative Education for Children and Youth, 55*(4), 226–231.
- Haydon, T., Marsicano, R., & Scott, T. M. (2013). A comparison of choral and individual responding: A review of the literature. *Preventing School Failure, 57*(4), 181–188.
- Heward, W. L. (1994). Three low-tech strategies for increasing the frequency of active student response during group instruction. In R. Gardner, III, D. Sainato, J. O. Cooper, T. Heron, W. L. Heward, J. Eshleman, & T. A. Grossi (Eds.), *Behavior analysis in education: Focus on measurable superior instruction* (pp. 283–320). Pacific Grove, CA: Brooks/Cole.
- Heward, W. L., Courson, F. H., & Narayan, J. S. (1989). Using choral responding to increase active student response. *Teaching Exceptional Children, 21*(3), 72–75.
- Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004).
- Jimenez, B. A., Lo, Y., & Saunders, A. F. (2014). The additive effects of scripted lessons plus guided notes on science quiz scores of students with intellectual disability and autism. *Journal of Special Education, 47*(4), 231–244.
- Kagan, S., & Kagan, M. (2009). *Kagan cooperative learning*. San Clemente, CA: Kagan Publishing.
- Kamps, D. M., Barbetta, P. M., Leonard, B. R., & Delquadri, J. (1994). Classwide peer tutoring: An integration strategy to improve reading skills and promote peer interactions among students with autism and general education peers. *Journal of Applied Behavior Analysis, 27*(1), 49–61.
- Konrad, M., Joseph, L. M., & Eveleigh, E. (2009). A meta-analytic review of guided notes. *Education and Treatment of Children, 32*(3), 421–444.
- Konrad, M., Joseph, L. M., & Itoi, M. (2011). Using guided notes to enhance instruction for all students. *Intervention in School and Clinic, 46*(3), 131–140.



- Lambert, M. C., Cartledge, G., Heward, W. L., & Lo, Y. Y. (2006). Effects of response cards on disruptive behavior and academic responding during math lessons by fourth-grade urban students. *Journal of Positive Behavior Interventions, 8*(2), 88–99.
- Leung, K. C. (2015). Preliminary empirical model of crucial determinants of best practice for peer tutoring on academic achievement. *Journal of Educational Psychology, 107*(2), 558–579.
- Lorah, E. R., Parnell, A., Whitby, P. S., & Hantula, D. (2015). A systematic review of tablet computers and portable media players as speech generating devices for individuals with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*(12), 3792–3804.
- Mahon, K. (2014). *Creating a content strategy for mobile devices in the classroom*. Philadelphia, PA: Center on Innovations in Learning. Retrieved from <http://www.centeril.org/publications/Mobile-AppsInTheClassroom.pdf>
- Narayan, J. S., Heward, W. L., Gardner III, R., Courson, F. H., & Omness, C. K. (1990). Using response cards to increase student participation in an elementary classroom. *Journal of Applied Behavior Analysis, 23*(4), 483–490.
- Randolph, J. J. (2007). Meta-analysis of the research on response cards: Effects on test achievement, quiz achievement, participation, and off-task behavior. *Journal of Positive Behavior Interventions, 9*(2), 113–128.
- Robbins, J. K. (2011). Problem solving, reasoning, and analytical thinking in a classroom environment. *The Behavior Analyst Today, 12*(1), 41–48.
- Rohrbeck, C. A., Ginsburg-Block, M. D., Fantuzzo, J. W., & Miller, T. R. (2003). Peer-assisted learning interventions with elementary school students: A meta-analytic review. *Journal of Educational Psychology, 95*(2), 240–257.
- Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. *American Educator, 36*(1), 12–39.
- Rosenshine, B., & Berliner, D. C. (1978). Academic engaged time. *British Journal of Teacher Education, 4*, 3–16.
- Schnorr, C. I., Freeman-Green, S., & Test, D. W. (2015). Response cards as a strategy for increasing opportunities to respond: An examination of the evidence. *Remedial and Special Education*. doi:10.1177/0741932515575614
- Simonsen, B., Myers, D., & DeLuca, C. (2010). Teaching teachers to use prompts, opportunities to respond, and specific praise. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children, 33*(4), 300–318. doi:10.1177/0888406409359905
- Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2008). Evidence-based practices in classroom management: Considerations for research to practice. *Education and Treatment of Children, 31*(3), 351–380. Retrieved from [http://dropoutprevention.org/wp-content/uploads/2015/07/SolutionsFeb2011\\_Simonsen\\_Fairbanks\\_Briesch\\_Myers\\_Sugai\\_2008.pdf](http://dropoutprevention.org/wp-content/uploads/2015/07/SolutionsFeb2011_Simonsen_Fairbanks_Briesch_Myers_Sugai_2008.pdf)
- Singer, L., Crosland, K., & Fogel, V. (2013). *Effects of response cards on the disruptive behavior of students* (Unpublished master's thesis). Retrieved from ProQuest Dissertations and Theses database. (UMI No.1425297873).
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*(4), 571–581.
- Stav, J., Nielsen, K., Hansen-Nygaard, G., & Thorseth, T. (2010). Experiences obtained with integration of student response systems for iPod Touch and iPhone into e-learning environments. *Electronic Journal of e-Learning, 8*(2), 179–190.

- Swanson, E., Hairrell, A., Kent, S., Ciullo, S., Wanzek, J. A., & Vaughn, S. (2012). A synthesis and meta-analysis of reading interventions using social studies content for students with learning disabilities. *Journal of Learning Disabilities, 47*(2), 178–195.
- Tincani, M. (2011). *Preventing challenging behavior in your classroom: Positive behavior support and effective classroom management*. Waco, TX: Prufrock Press.
- Tincani, M., & Crozier, S. (2008). Comparing brief and extended wait-time during small group instruction for children with challenging behavior. *Journal of Behavioral Education, 16*(4), 355–367.
- Tincani, M., Ernsbarger, S., Harrison, T. J., & Heward, W. L. (2005). Effects of two instructional paces on pre-K children's participation rate, accuracy, and off-task behavior in the "Language for Learning" program. *Journal of Direct Instruction, 5*(1), 97–109.
- Twyman, J. S., & Heward, W. L. (2016). How to improve student learning in every classroom now. *International Journal of Educational Research*. doi:10.1016/j.ijer.2016.05.007
- Van Norman, R. K., & Wood, C. L. (2008). Effects of prerecorded sight words on the accuracy of tutor feedback. *Remedial and Special Education, 29*(2), 96–107.



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## Appendix: Key Terms

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**Active Student Response (ASR):** A student’s detectable audible or physical response to ongoing instruction, such as by saying, typing, or writing an answer in response to an instructional antecedent.

**Alterable Variables:** Instructional, curricular, or behavioral strategies within educators’ control that, when changed, lead to measurable improvements in student engagement and performance.

**Brisk Instructional Pacing:** When the teacher moves through question–response–feedback sequences as quickly as possible, but without hurrying the students.

**Choral Responding:** An instructional strategy in which students orally respond in unison to teacher-posed questions.

**Evidence-Based Practice:** A decision-making process for clinical and educational settings that incorporates the best available evidence with clinical expertise and client values and context.

**Guided Notes:** Teacher-prepared handouts that guide a student through a lecture with standard cues and prepared space in which to write key facts, concepts, and/or relationships.

**High-ASR Strategies:** Strategies shown by research to demonstrate consistently high levels of active student response during small- or whole-group instruction.

**Peer Tutoring:** A collection of strategies that employ peers as one-on-one teachers of academic or related content.

**Pre-printed Response Cards:** Cards with an array of pre-printed student response options.

**Response Cards:** Cards that students may use to simultaneously answer teacher-posed questions by writing their answers with dry-erase markers or by selecting the appropriate response from an array of choices.

**Schoolwide Positive Behavior Support:** A systems-level strategy to prevent challenging behavior and academic failure in schools consisting of primary, secondary, and tertiary supports.

**Student Engagement:** Students’ motivation and opportunity to practice, learn, and master a particular skill.

**Student Response Systems (SRS):** Commercially available systems that use a radio receiver and student clickers to enable student responses during small- or whole-class lessons.

**Write-on Response Cards:** Response cards with a dry-erase surface on which students write responses.

## About the Authors

**Matt Tincani, Ph.D.**, is an associate professor of special education and applied behavior analysis in the Department of Psychological Studies in Education at Temple University. He has worked in the field of education for over 20 years as a therapist, teacher, program supervisor, researcher, and university instructor. A Board Certified Behavior Analyst, he has developed several university-based programs to prepare professionals who support students with learning and behavioral challenges and disabilities. He was founding director of Nevada's only university-based autism center, and has held a variety of state and national leadership positions, serving most recently on the Board of Directors of the Association for Positive Behavior Support. He has authored or coauthored over fifty articles, book chapters, and books featuring research and practical strategies to teach communication, socialization, and academic skills. He is author of the recent book, *Preventing Challenging Behavior in Your Classroom: Positive Behavior Support and Effective Classroom Management* by Prufrock Press, which details the educational strategies discussed within this practice guide.

**Janet S. Twyman, Ph.D., BCBA**, is an associate professor of pediatrics at the University of Massachusetts Medical School and the director of innovation and technology for the Center on Innovations in Learning. A career educator, Twyman has been a preschool and elementary school teacher, a principal and school administrator, and a university professor. She has worked directly improving the personalization of learning via the engineering of self-paced learning with typically developing students, preschoolers with intellectual disabilities, adolescents with emotional and behavioral problems, learners with autism spectrum disorders, college students, and adults. For almost two decades, she has worked at the forefront of merging evidence-based educational methods with new and emerging technologies, including selecting technologies that incorporate adaptive instructional systems to support personalized learning. As a vice president at Headsprout, she led the design, development, and dissemination of the company's Internet-based reading programs and oversaw their implementation in over 1,500 public and private schools. In 2007–2008 she served as president of the Association for Behavior Analysis International.



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