

# Examining the Effects of Teacher-Directed Opportunities to Respond on Student Outcomes: A Systematic Review of the Literature

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## Abstract

Research indicates that increasing teacher-directed opportunities to respond (TD-OTR) positively impacts student outcomes. Prior reviews of the empirical literature focused on outcomes for students with emotional behavioral disorders or on TD-OTRs as one of many classroom-management practices; however, prior reviews did not examine effects of TD-OTRs solely within the class-wide context. For the present review, we (a) examined class-wide TD-OTR research (i.e., screened a total of 527 unique abstracts and identified, reviewed, and coded 15 empirical studies); (b) summarized the effects of class-wide TD-OTRs on student behavioral and academic outcomes, including differential impacts by modality; and (c) described the rates of TD-OTRs documented in the literature. Results are consistent with prior reviews, supporting positive behavioral and academic student outcomes when class-wide TD-OTRs are increased, and extend the literature by identifying differential outcomes by modality and describing observed and desired rates of TD-OTR delivery.

*Keywords:* opportunity to respond (OTR), teacher-directed opportunities to respond (TD-OTR), review of literature, student academic achievement, student behavior

**A**s the field of education continues to embrace inclusive learning environments, the need to support every student with a core

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foundation of empirically supported academic and behavior support practices is acute (Conroy, Sutherland, Snyder, & Marsh, 2008; Lewis, Hudson, Richter, & Johnson, 2004; MacSuga-Gage, Simonsen, & Briere, 2012; Simonsen et al., 2010). To accomplish this goal, research supports setting up classroom environments that promote positive academic and behavioral outcomes through the application of class-wide instructional and behavior support strategies (Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008). Within the context of empirically supported classroom management practices there are several categories of practices that improve the active engagement of all students (Simonsen et al., 2008). One key effective instructional practice with growing empirical support is providing all students with frequent and varied opportunities to respond (OTR; Lewis et al., 2004; Sutherland & Wehby, 2001).

Opportunities to respond are defined as behaviors (i.e., antecedent stimuli) that occasion student responses, followed by feedback (i.e., the consequence of engaging in the response behavior; Ferkis, Belfiore, & Skinner, 1997). There are multiple ways that OTR can be delivered to students, including by the teacher during direct instruction, by peers (e.g., class-wide peer tutoring, cooperative learning groups), or via a mediated interface (e.g., a computer game; Haydon, MacSuga-Gage, Simonsen, & Hawkins, 2012). Increasingly research has focused on ways to provide teachers with effective training and in-service support around the implementation of research-supported classroom management practices (e.g., Reinke, Lewis-Palmer, & Merrell, 2008; Simonsen, MacSuga-Gage, Briere, Freeman, Myers, Scott, & Sugai, 2014). This research highlights the importance of prioritizing strategies that teachers can implement independently within the classroom setting. Thus, this review, similar to the previous review of OTR conducted by Sutherland and Wehby (2001), focused exclusively on examining OTR that occurred as a result of direct teacher instruction. To that end, teacher-directed opportunities to respond (TD-OTR) are defined in the same context presented by Ferkis et al. (1997) as teacher behaviors (i.e., antecedent stimuli) that occasion student responses. Specifically, the teacher presents a TD-OTR (i.e., the antecedent stimulus) to one or more students, the student(s) have a chance to respond, and the teacher provides feedback contingent on student responses. While teachers can employ a myriad of strategies to actively engage students (e.g., class-wide peer tutoring, computer assisted instruction), providing students with increased TD-OTRs is unique because teachers are able to alter their own teaching behavior during direct instruction to directly impact student outcomes. This review focuses on two categories of TD-OTRs: (a) teacher-directed individual responses and (b) teacher-directed unison responses. Lambert,

Cartledge, Heward, and Lo (2006) describe “traditional” teacher-directed individual response as “calling on only one student to answer the question while the rest of the class sits quietly and listens” (p. 89). Teacher-directed unison response occurs when a teacher presents a request to an entire group of students who are prompted to respond through either verbal communication (e.g., choral responding) or non-verbal communication (e.g., gestural responses such as hand raising or thumbs up/down; written responses, such as response cards; e.g., Carnine, 1976; Haydon, Conroy, Scott, Sindelar, Barber, & Orlando, 2010; Haydon & Hunter, 2011; Lambert et al., 2006).

Reviews of empirically supported classroom-management practices, generally (Simonsen et al., 2008), and practices to support students with school-based behavior problems, including those with emotional and/or behavioral disorders (EBD; Lewis et al., 2004), summarize empirical support of positive academic and behavioral outcomes for students’ receiving increased classroom-management strategies, including OTRs. However, these reviews focus on classroom-management practices generally, not TD-OTRs exclusively. Sutherland and Wehby (2001) focused on TD-OTRs, but exclusively on the relationship between increasing TD-OTRs and the academic and behavioral outcomes of students with EBD.

In total, Sutherland and Wehby (2001) identified six studies that met all three inclusion criteria: (a) participants identified as students with EBD, (b) study measured the impact of increased TD-OTRs on student behavior or academic achievement, and (c) published in peer-reviewed journal. Generalization from their review is limited due to the small and homogenous sample of studies (four of the six studies were from the same research team), yet it yields important descriptive information about the impacts of increased TD-OTRs for students with EBD. Overall, findings indicate positive effects on academic and behavioral outcomes, including increased task engagement, decreased disruptive behavior, and increased efficiency in the use of class time. Further, Sutherland and Wehby (2001) identify two studies (Van Acker, Grant, & Henry, 1996; Wehby, Symons, & Shores, 1995) that reported descriptive information about naturally occurring OTR rates for students with EBD, indicating that they typically received an average of 0.02–0.16 OTRs per minute.

Sutherland and Wehby (2001) shed light on the effects of TD-OTR; however, their review (a) focused only on students with EBD, limiting generalization to the majority of students; (b) did not include detailed descriptive information about the impact by type of response modality (e.g., individual responding, choral responding, response cards); and (c) was conducted more than a decade ago. Therefore,

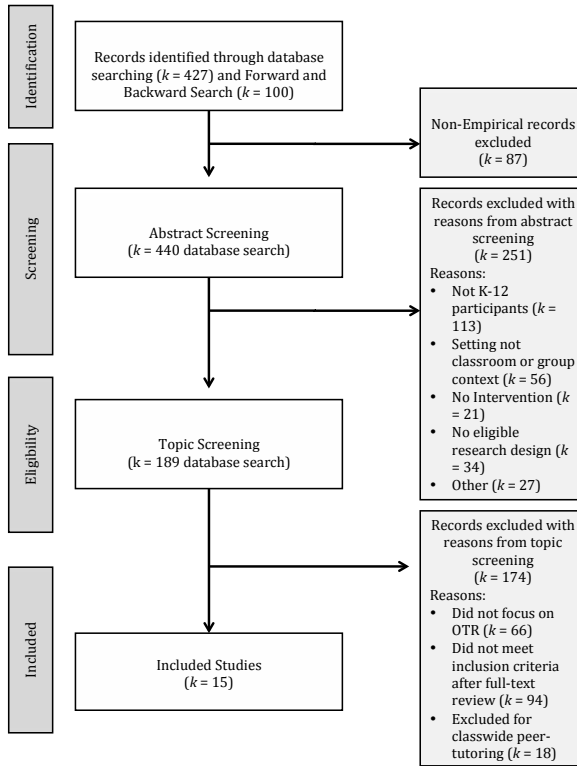


Figure 1. Systematic review process.

an up-to-date review of the literature examining (a) the effects of increased rates of TD-OTRs on outcomes for all students (with and without disabilities) across classroom contexts (i.e., general and special education classrooms) and (b) a review of differential effects by varied modalities and rates of TD-OTRs is necessary.

### Purpose of This Review

The purpose of this literature review is to systematically examine the empirical literature to assess the impact of TD-OTRs on student behavioral and academic outcomes, including differential effects by modality. Specifically, this review addresses the following questions:

1. What are the characteristics of the empirical literature examining TD-OTRs?

2. What are the differential effects of varying the modality of TD-OTRs presented on student behavior and/or academic performance?
3. What are the differential effects of varying the rate of TD-OTRs presented on student behavior and/or academic performance?

### Method

We used a multiphase review procedure to complete a systematic review of the literature examining TD-OTRs. Procedures included (a) systematic electronic database search, (b) three phases of review (including a forward and backward search of initially identified studies), and (c) structured coding. For reference, Figure 1 provides a visual representation of the systematic review process. Overall, 527 abstracts were reviewed.

#### *Initial Search Procedures*

The first author performed a systematic electronic search of five common education databases (Academic Search Premier, ERIC, Professional Development Collection, Psychology and Behavioral Sciences Collection, and PsycINFO) using search terms selected from recent research and literature reviews (e.g., Haydon & Hunter, 2011; Simonson et al., 2008; Sutherland & Wehby, 2001). Results from this initial search contained all available online references up to April 2012. To identify potentially relevant studies, the first author used a Boolean search across four inclusion criteria (separated by “AND”): (a) interventions employed, (b) student and/or teacher behaviors measured, (c) settings, and (d) research design (please contact the first author for complete search terms). We set search parameters to capture scholarly and peer-reviewed empirical publications, excluding all technical and research reports that may or may not be peer reviewed (e.g., dissertations, technical manuals, government reports, conference presentations). A total of 427 unique abstracts were identified and screened for inclusion during the initial search.

#### *Phases of Review*

We used a three-phase review approach to identify studies for inclusion.

*Phase 1: Abstract review.* We conducted Phase 1 screening in three steps. First, the first author evaluated abstracts to determine whether the article was empirical or nonempirical. Empirical records included any record that reported the results of a quantitative research design. Nonempirical records included any nonexperimental records (e.g., reviews of literature, position papers, books, program descriptions, practice papers). The first author read and categorized all unique

abstracts ( $k = 427$ ) into empirical ( $k = 340$ ) or nonempirical ( $k = 87$ ). The 340 empirical abstracts were then passed to step 2.

Second, the first author coded each empirical abstract ( $k = 340$ ) across five categories for inclusion: (a) participant population (K–12 student), (b) setting (general and special education classrooms), (c) independent variables (classroom-management strategies as defined by Simonsen et al., 2008, including teacher praise, TD-OTRs, and so on; see the note under Table 2 for a complete listing of these strategies), (d) dependent variables (student academic or behavioral outcomes), and (e) research design (group design or single subject). Abstracts must have met all five criteria to pass on to step 3. For example, studies were excluded if the study was a case study or if the no intervention was investigated. A total of 91 abstracts passed initial full abstract review and moved to step 3.

Third, we reviewed the 91 abstracts to determine whether the article focused exclusively on TD-OTR in a classroom setting. As stated earlier, to align with the work of Sutherland and Wehby (2001) and to inform ongoing research efforts aimed at increasing teachers' implementation of research-based classroom management strategies, this review focused solely on empirical studies examining response opportunities directed by teachers. Specifically, studies must have examined the effect of TD-OTRs on student outcomes; we excluded peer tutoring because the opportunity to respond is not teacher directed. The topic screen identified a final sample of seven studies from this phase of review that met all inclusion criteria. For a complete list of Phase 1 inclusion criteria see Table 2.

*Phase 2: Backward and forward search.* Next, we completed a backward and forward search (Card, 2012) of all articles included from the database search ( $k = 7$ ). The first author examined the reference sections of each included study to identify additional records not found in the database search. We also conducted a forward search using the Web of Science to identify articles citing the seven included studies. The combined backward and forward searches yielded 100 additional unique abstracts, which were then examined using the Phase 1 procedures outlined earlier. Screening of the 100 abstracts identified in the forward and backward search yielded eight additional studies eligible for inclusion. Thus, a total of 15 articles met all inclusion criteria, identifying them for inclusion in this review.

*Phase 3: Full article coding.* The first author then fully coded all included studies across the following categories: participant characteristics, criteria for participant inclusion in the study, independent variables, dependent variables, fidelity of implementation/treatment integrity, social validity, research design, modes of data analysis, and results.

*Interobserver agreement.* We conducted interobserver agreement (IOA) for 30% of all abstracts ( $k = 160$ ), topic screens ( $k = 34$ ), and full codes ( $k = 5$ ). A trained postdoctoral fellow coded all selected entries using the same coding procedures described earlier. A point-by-point comparison of coding from the primary coder (i.e., the first author) and the secondary coder indicated high IOA using the agreement rate calculation (Orwin & Vevea, 2009): abstracts ( $M = 90\%$ , range 82%–97%), topic screens ( $M = 99\%$ , range 93%–100%), and full codes ( $M = 92\%$ , range 86%–96%).

## Results

### *Characteristics of Included Studies*

A total of 15 studies focusing on class-wide TD-OTRs met all inclusion criteria. The publication dates for the studies included ranged from 1968 to 2012, with six published in the past 9 years (Blood, 2010; Davis & O'Neill, 2004; Haydon & Hunter, 2011; Lambert et al., 2006; Sutherland, Alder, & Gunter, 2003). Table 1 presents detailed descriptions of study sample, settings, design, variables, measures, and findings.

*Student sample characteristics.* Across all 15 studies, a total of 172 students served as participants. Student grade levels were specified (grades 1–11 represented) for all but three of the studies (Kamps, Dugan, Leonard, & Daoust, 1994; Sutherland et al., 2003; Wolery, Ault, Doyle, & Gast, 1992), which described their sample in years of age. Overall, studies included students that received general education ( $k = 7$ ) and special education ( $k = 8$ ), including students with autism, intellectual disabilities (ID), EBD, other health impairment (OHI), learning disabilities (LD), and traumatic brain injuries (TBI).

*Study settings.* A variety of study settings were represented in this sample. The majority of studies ( $k = 11$ ) took place in elementary settings. The rest of the studies took place in middle schools (Davis & O'Neill, 2004; Haydon & Hunter, 2011), one high school (Blood, 2010), or in unspecified public school settings (Wolery et al., 1992). Of those studies conducted at the secondary level (i.e., middle and high school) only one focused on the general education setting, and the other two were conducted in special education settings (i.e., classroom instruction was led exclusively by a special education teacher). Included studies covered a wide variety of content areas including: American history, English, science, language arts, functional language skills, math, geography, health, reading, and spelling.

*Study design.* All but one of the studies used a single-subject design. A total of eight studies employed a reversal/withdrawal design

or a variation (i.e., Kamps et al., 1994, used reversal/withdrawal with counterbalancing) of that design. Other experimental single-subject designs included alternating treatments ( $k = 4$ ), combined alternating treatment with reversal/withdrawal ( $k = 1$ ), and a multielement design ( $k = 1$ ). Only McKenzie and Henry (1979) employed a group experimental design using a random assignment with post test.

*Independent variables.* Researchers studied two categories of independent variables across all 15 studies: (a) comparison of class-wide TD-OTR modalities (Blood, 2010; Haydon & Hunter, 2011; Haydon et al., 2010; Kamps et al., 1994; McKenzie & Henry, 1979; Sindelar, Bursuck, & Halle, 1986; Wolery et al., 1992), including response cards (Davis & O'Neill, 2004; Gardner, Heward, & Grossi, 1994; Lambert et al., 2006; Narayan, Heward, Gardner, Courson, & Omness, 1990), and (b) increasing class-wide rates of TD-OTR presentation (Carnine, 1976; Sterling, Barbetta, Heward, & Heron, 1997; Sutherland et al., 2003; West & Sloane, 1986). Seven studies looked at the differential effects of single or individual student responding versus unison responding (e.g., choral responding; Haydon & Hunter, 2011; Haydon et al., 2010; Kamps et al., 1994; McKenzie & Henry, 1979; Sindelar et al., 1986; Sterling et al., 1997; Wolery et al., 1992). Within this group, the study conducted by Kamps and colleagues (1994) is of note because it examined the impact of an OTR-rich responding package called "enhanced small group instruction" (i.e., choral responding, student-to-student responding, frequent variation of materials, and random opportunities to individually respond) with typical teacher instruction (i.e., individual presentation of OTRs at an unspecified rate). Five studies compared the effects of a single specific modality, specifically choral response OTRs. Of those, four examined the impact of response cards (Davis & O'Neill, 2004; Gardner et al., 1994; Lambert et al., 2006; Narayan et al., 1990). Response cards are either sets of preprinted cards with answer choices or erasable whiteboards that students can write on with a marker. In these studies, the teacher presented an OTR to the whole class and all students used their individual response cards to indicate an answer. Similar to the response-card strategy, one study (Blood, 2010) used a computerized student response system (SRS) to provide students with choral response opportunities. The SRS is a polling system that allows students to use a small handheld device (clicker) to respond to multiple-choice or true-false questions. Student responses are immediately displayed as a graph depicting the percentage of responders who chose each possible answer. Two of the studies compared the differential effects of researcher-selected TD-OTR rates (i.e., fast vs. slow presentation), and one study (Sutherland et al., 2003) asked teachers to increase their rates of OTRs to a



researcher-specified criterion (3.00 per minute) during intervention that included teacher performance feedback and graphing.

*Dependent variables.* Across the 15 studies, a variety of student and teacher variables were assessed. Although there was slight variation among student variable names (e.g., participation and active student responding), the following 10 categories represent the student outcome measures collected in order of frequency: academic achievement ( $k = 10$ ), answering correctly ( $k = 9$ ), response rate ( $k = 6$ ), on-task behavior ( $k = 5$ ), disruptive behavior ( $k = 4$ ), off-task behavior ( $k = 3$ ), active student responding ( $k = 2$ ), test anxiety ( $k = 1$ ), incorrect responses ( $k = 1$ ), and no responses ( $k = 1$ ). Teacher variables were collected in less than half ( $k = 6$ ) of the studies (Carnine, 1976; Gardner et al., 1994; Haydon & Hunter, 2011; Kamps et al., 1994; Narayan et al., 1990; Sutherland et al., 2003). These variables included (in order of frequency collected): teacher rates of OTRs presented ( $k = 4$ ), praise statements ( $k = 2$ ), redirections ( $k = 1$ ), and instructional statements ( $k = 1$ ).

*Study measures of fidelity and social validity.* Results of fidelity of implementation and social validity across studies were often not reported or collected. Approximately half of the studies reported fidelity (Blood, 2010; Haydon & Hunter, 2011; Haydon et al., 2010; Lambert et al., 2006; Sindelar et al., 1986; Sterling et al., 1997; West & Sloane, 1986) and social validity (Davis & O'Neill, 2004; Haydon & Hunter, 2011; Haydon et al., 2010; Kamps et al., 1994; Lambert et al., 2006; Narayan et al., 1990) data. Fidelity measures included direct observation of classrooms and/or checklists. Across the studies assessing fidelity, teachers were able to implement interventions with fidelity (e.g., by meeting predetermined TD-OTR presentation rates; Kamps et al., 1994). Researchers assessed social validity post-intervention using researcher-created measures (e.g., questionnaires, two-item student questions, satisfaction surveys) and interviews with teachers and students. Overall, social validity measures (when included/reported) indicated that teachers perceived greater student learning during increased TD-OTR conditions and students preferred increased OTRs to other approaches.

#### *Differential Effects of Varying OTR Modality*

Eleven studies examined the impact of TD-OTR modality (i.e., how TD-OTRs were delivered to students) on student outcomes. Six studies examined differences between unison TD-OTRs (i.e., verbal and nonverbal choral response) and individual TD-OTRs. Five studies described positive outcomes resulting from various forms of implementing unison response (where no other formal type of response format was consistently present) including: increased on-task behavior (Haydon &

**Table 1.**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Blood, 2010	Single-subject design (ABABC) <i>n</i> = 5	<i>Type of OTR:</i> Mode(s) of OTR Student Response System (SRS) SRS is a polling system that allows students to use small, handheld devices (clicker) to respond to multiple-choice and true-false questions. Student responses are immediately displayed as a graph depicting the percentage of responders who chose each possible the correct answer	Student variables: • On-task behavior (DO) • Academic achievement (PP) • Response rate (DO) Teacher behaviors: NA Fidelity of implementation: evaluated using DO Social validity: NA	Increases in response rates: students responded more frequently to formal questions when the SRS was in use than in the baseline condition. No functional relationship demonstrated for student on-task behavior and no functional relationship across phases on academic achievement permanent products (i.e., individual daily quiz or end-of-phase test scores).
	2 students with EBD, 2 students with OHI, and 1 student with autism	<i>Continuum of reinforcement:</i> NA		
Carmine, 1976	Single-subject design (ABABAB) <i>n</i> = 2	<i>Type of OTR:</i> Rates of OTR Slow-rate presentation phase: the teacher presented a prompt and, after the final student response, she counted to five before delivering the next prompt. Fast-rate presentation phase: the teacher presented a prompt and, after the final student response, the teacher immediately provided the next prompt.	Student behaviors: • Off-task behavior (DO) • Student participation (DO) • Answering correctly (DO) Teacher behaviors: • Rates of OTR presented (DO) Fidelity of implementation: NA Social validity: NA	Decreases in off-task behavior: both students demonstrated decreased off-task behavior during fast presentation. Increases in answering correctly: Student 1 demonstrated more correct answers during fast presentation; Student 2, slow and fast presentation were equal during the first AB phases but for the final two AB phases fast presentation yielded more correct responses. Increased participation: Student 1 participated more frequently during fast presentation; Student 2 demonstrated equally high rates of participation during the first AB phases and then demonstrated higher rates of participation during fast presentation across the final four phases.
	Elementary General education	<i>Continuum of reinforcement:</i> Specific and/or contingent praise		

**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Davis & O'Neill, 2004	Single-subject design (alternating treatments and ABAB) n = 4 Middle school SPED 2 ESL students, 3 students with LD, 1 student with TBI	<i>Type of OTR:</i> Mode(s) of OTR Response cards RC condition: students used erasable whiteboards that they held up, and they received a bean for writing an answer regardless of accuracy. Hand-raising condition: students received one bean in a jar for raising their hands and an additional bean if they were called on and responded correctly. <i>Continuum of reinforcement:</i> Individual and class-wide group contingencies	Student behaviors: • Off-task behavior (DO) • Academic achievement (PP) • Correct academic response (DO) • Hand raising (DO) Teacher behaviors: NA Fidelity of implementation: NA Social Validity: Two-item student completed measure	Mixed findings for off-task behavior: two of the four students demonstrated lower off-task behavior during RC conditions. Increases in academic achievement: students displayed higher average levels of correct academic responding during RC conditions (M = 91%) compared to HR conditions (M = 74%), and group average weekly quiz scores were higher during the RC conditions (M = 88%) compared with the HR conditions (M = 19%) Increases in correct academic response: the RC condition resulted in higher levels of academic responses during both initial presentation and follow-up probes for all students.
Gardner, Heward, & Grossi, 1994	Single-subject design (ABAB) n = 24 Elementary General education	<i>Type of OTR:</i> Mode(s) of OTR Response cards RC condition: students were provided a white laminated particle board (22.9 cm by 30.5 cm) to write responses Hand-raising condition: a randomized list of student names was used to ensure all students were called <i>Continuum of reinforcement:</i> Specific and/or contingent praise	Student behaviors: • Academic achievement (PP) • Number of student responses (DO) • Accuracy of student responses (DO) Teacher behaviors: • Teacher OTR presentation rate (DO) <i>Fidelity of implementation:</i> NA Social validity: End-of-study interview with students	Increases in academic achievement: overall mean score (next-day quizzes) for the entire class sessions was 57% correct during HR and 70% correct during the RC phase. Increases in number of student responses: the number of academic responses during HR averaged 1.5 times per session, while responding averaged 21.8 times per session during RC. Increases in accuracy of student responses: accuracy of student responses was higher during both experimental methods, averaging 93% during the RC phase.

**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Haydon & Hunter, 2011	Single-subject design (ABCBC) n = 2 Middle school General education	Type of OTR: Mode(s) of OTR Single-student response, unison hand raising Single-student response (SR) condition: the teacher randomly called on students, Unison hand-raising (UR) condition: the teacher asked all students to simultaneously raise their hands Continuum of reinforcement: NA	Student behaviors: • On-task behavior (DO) • Academic achievement (PP) • Correct responses (DO) Teacher behaviors: • Rates of praise statements (DO) • Redirection (DO) <i>Fidelity of implementation:</i> evaluated using DO of presentation of OTR Social validity: Teacher completed 9-item scale and student completed 9-item scale	Increases in on-task behavior: the target student's mean percentage of intervals on task was higher during both increased OTR conditions, but slightly higher during the UR condition. Increases in academic achievement: positive results were evident in both UR and SR conditions. No functional relationship demonstrated for correct responses because no baseline data were included. Teachers increased their rates of OTR (fidelity) and praise statements and decreased redirections during both intervention conditions.
Haydon, Conroy, Scott, Sindelar, Barber, & Orlando, 2010	Single-subject design (alternating treatments) n = 6 Elementary General education	Type of OTR: Mode(s) of OTR Single-student response, choral response, mixed response Individual responding condition: the teacher randomly called on individual students Choral responding condition: the teacher asks all students to respond simultaneously Mixed-model responding condition: the teacher called on individual students for some questions and asked all students to respond to different questions.	Student behaviors: • Off-task behavior (DO) • Disruptive behaviors (DO) • Active student responding (DO) Teacher behaviors: NA <i>Fidelity of implementation:</i> evaluated using direct observation of teacher behavior and teacher-completed checklist	Decreased off-task behavior: the mean percentage of off-task behavior was less in the mixed responding condition. Decreased disruptive behavior: the mean rate of disruptive behavior per minute was less during the mixed responding condition. Increased active responding: the mean percentage of active student responding was higher in the mixed-response condition.

Table 1. (Continued)  
 Research Design and Results of All Included Studies

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Kamps, Dugan, Leonard, & Daoust, 1994	Single-subject design (BABAB and ABABB) $n = 24$ Elementary SPED 12 with mild ID (5 boys and 7 girls) 12 with autism (8 boys and 4 girls)	<p><i>Type of OTR:</i> Mode(s) of OTR</p> <p>Single-student response, choral response, student-to-student response</p> <p>The use of an "enhanced small-group instruction" package using choral responding and student interaction.</p> <p>Package components included the following:</p> <p>Choral responding: simultaneous responding by all students in the group, with a minimum of 25 statements indicating group response per session</p> <p>Student-to-student responding: the teacher prompting a student to show another student an item, with a minimum of 25 student-to-student trials per session</p> <p>Frequent rotation of materials: Every 5 minutes the teacher would rotate the materials being taught</p> <p>Random responding: teacher called on students at random (either individually or as a group)</p> <p><i>Continuum of reinforcement:</i> NA</p>	<p><i>Social validity:</i> Teacher completed 9-item scale</p> <p>Student behaviors:</p> <ul style="list-style-type: none"> <li>• Academic achievement (PP)</li> <li>• Responses to teacher (DO)</li> </ul> <p>Teacher behaviors:</p> <ul style="list-style-type: none"> <li>• Instructional statements</li> </ul> <p><i>Fidelity of implementation:</i> NA</p> <p><i>Social validity:</i> Teacher-completed satisfaction survey</p>	<p>Fidelity measures indicated adherence to intervention procedures.</p> <p>Increased academic achievement: all students showed higher gains on weekly assessments during experimental conditions.</p> <p>Increased responses to teachers: all students increased levels of responding during experimental conditions. More correct responses were recorded during choral and student-to-student responses.</p> <p>Teacher's instructional statements did not increase the total number of statements to individuals, but did increase (a) the use of group statements and (b) the number of student-to-student interactions.</p>

**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Lambert, Cartledge, Heward, & Lo, 2006	Single-subject design (ABAB) <i>n</i> = 9 Elementary General education	<i>Type of OTR:</i> Mode(s) of OTR Response cards RCs condition: students used erasable whiteboards that they held up in response to a teacher question Single student response: the teacher randomly called on individual students <i>Continuum of reinforcement:</i> NA	Student behaviors: <ul style="list-style-type: none"> <li>Disruptive behavior (DO)</li> <li>Academic responses (DO)</li> <li>Correct academic response (DO)</li> </ul> Teacher behaviors: NA Fidelity of implementation: evaluated using a checklist completed by the research team Social validity: 8-item open-ended consumer satisfaction questionnaire	Decreased disruptive behavior: immediate and sustained of level changes during the RC condition. Increased academic responses: the frequency of academic responses was higher during the RC condition. No functional relationship was identified for correct academic responding; the accuracy of responses was variable in both the RC and the single-student response conditions. Overall, the teacher implemented both conditions with fidelity.
McKenzie & Henry, 1979	Group experiment post-test only; random assignment <i>n</i> = 52 Elementary General education	<i>Type of OTR:</i> Mode(s) of OTR Single-student response, choral responding Individual responding condition: questions were presented to the whole class and then a single student was called on to answer Test-like events (choral responding) condition: teacher required frequent overt and interpretable responses from all students (i.e., hand raising to indicate response to a teacher-directed prompt) <i>Continuum of reinforcement:</i> NA	Student behaviors: <ul style="list-style-type: none"> <li>On-task behavior (DO)</li> <li>Student academic achievement (PP)</li> <li>Test anxiety (RS)</li> </ul> Teacher behaviors: NA <i>Fidelity of implementation:</i> NA <i>Social validity:</i> NA	Increases in on-task behavior: more students were on-task in the test-like condition than in the individual responding condition ( <i>p</i> = .05). Increases in academic achievement: A test was presented at the end of the unit, resulting in a significantly higher scores in the test-like events condition ( <i>p</i> = .01). No differences were found between the groups on the measure of test anxiety.

**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Narayan, Heward, Gardner, Courson, & Omness, 1990	Single-subject design (ABAB) n = 20 (achievement data) n = 6 (observational behavior data) Elementary General education	<i>Type of OTR:</i> Mode(s) of OTR Response cards RC condition: students used white laminated particleboard (9 inches by 12 inches, 22.9 cm by 30.5 cm) to write responses to the teacher's questions with a dry-erase marker Hand-raising condition: teacher waited 3 seconds after prompting students before calling on an individual student <i>Continuum of reinforcement:</i> Specific and/or contingent praise	Student behaviors: • Academic achievement (PP) • Number of responses (DO) • Accuracy of student responses (DO) Teacher behaviors: • Rate of OTR presentation <i>Fidelity of implementation:</i> NA <i>Social validity:</i> Individual interviews with the students	Increased academic achievement: the mean quiz score for 19 of the 20 students was higher during the RC condition than it was for the HR condition. Increased number of responses: the number of responses (i.e., orally answering the teacher's question) averaged 0.9 response during the HR condition, and an average of 15.6 responses during the RC condition. No functional relationship was identified for accuracy of student responding; the accuracy of responses was variable in both the RC and the HR conditions. Increase teacher's rate of OTR presentation: no evaluative data on teacher OTR rate; study just noted OTR presentation rate was 1.9 minutes for HR condition and 1.2 minutes for RC condition.
Sindelar, Bursuck, & Halle, 1986	Single-subject design (alternating treatments) n = 11 Elementary SPED 8 with LD, 3 with mild ID	<i>Type of OTR:</i> Mode(s) of OTR Single-student response, choral response Ordered responding condition: students sat in semicircles and the teacher called on them in order Unison responding condition: students responded simultaneously to each teacher presentation. <i>Continuum of reinforcement:</i> NA	Student behaviors: • On-task behavior (DO) • Academic achievement (DO and PP) Teacher behaviors: NA <i>Fidelity of implementation:</i> evaluated by an independent observer checklist and personal judgment <i>Social validity:</i> NA	A functional relationship between conditions for on-task behavior was not documented. Mixed findings for academic achievement: students learned the words taught with unison responding at a faster rate than the words taught with ordered responding; however, the difference was small.

**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
Sterling, Barbetta, Heward, & Heron, 1997	Single-subject design (alternating treatments) n = 5 Elementary SPED 1 with LD, 4 with DD	<p><i>Type of OTR:</i> Rates of OTR</p> <p>Active student responding condition: the teacher modeled the correct response to a health question presented visually on a health fact card, and the students immediately repeated the correct response in unison (choral response) three times</p> <p>On-task instruction condition: students attended visually to the health fact card as the teacher modeled the correct response, no response was required of the students</p> <p><i>Continuum of reinforcement:</i> NA</p>	<p>Student behaviors:</p> <ul style="list-style-type: none"> <li>• Student academic achievement (PP)</li> </ul> <p>Teacher behaviors: NA</p> <p><i>Fidelity of implementation:</i> evaluated with direct observation</p> <p><i>Social validity:</i> NA</p>	<p>Increases in academic achievement: students learned more health facts in the active student responding condition compared to the on-task instruction condition; the active student response condition produced consistently higher mean scores from the first day of instruction.</p>
Sutherland, Alder, & Gunter, 2003	Single-subject design (ABAB) n = 9 Elementary SPED All 9 with EBD	<p><i>Type of OTR:</i> Rates of OTR</p> <p>Intervention focused on increasing teachers' presentation of OTRs by providing teachers with daily performance feedback and asking teachers to graph their own OTR presentation daily. A goal of 3.00 OTRs per minute during intervention was set for all teachers.</p> <p><i>Continuum of reinforcement:</i> Specific and/or contingent praise</p>	<p>Student behaviors:</p> <ul style="list-style-type: none"> <li>• On-task behavior (DO)</li> <li>• Disruptive behaviors (DO)</li> <li>• Correct responses (DO)</li> </ul> <p>Teacher behaviors:</p> <ul style="list-style-type: none"> <li>• Rate of OTR</li> <li>• Rate of Praise</li> </ul> <p><i>Fidelity of implementation:</i> NA</p> <p><i>Social validity:</i> NA</p>	<p>Increases in on-task behavior: students' percentage of time on task increased during the increased OTR condition.</p> <p>Increases in correct responses: student mean rate and percentage of correct responses increased during the increased OTR condition.</p> <p>Decreases in disruptive behavior: the rate of disruptive behaviors slightly decreased during the increased OTR condition.</p> <p>Increases in rates of OTR: teachers mean rate of OTR per minute during baseline was 1.68 and increased to a mean rate of 3.5 during the increased OTR condition.</p> <p>Teacher praise rates did not show a functional relationship.</p>



**Table 1. (Continued)**  
**Research Design and Results of All Included Studies**

Study	Design/Sample	Independent Variable(s)	Dependent Variable(s)	Results
		<i>Type of OTR:</i> Rates of OTR		
		Four combinations of fast/slow rates of OTR presentation paired with high and low reinforcement points were compared	Student behaviors: • Disruptive behaviors (DO) • Correct responding (DO) • Performance accuracy (PP)	Mixed findings for disruptive behavior: decreases in disruptive behavior were evident during fast presentation sessions but point delivery (i.e., fast vs. slow) appeared not to have a functional effect. Mixed findings for correct responding: slight increase in correct responding per minute were noted during fast presentation versus slow; correct responses per minute were not functionally related to point delivery.
West & Sloane, 1986	Elementary SPEID 4 with EBD, 1 with ID	Fast presentation consisted of new tasks presented every 20 seconds and slow presentation was every 60 seconds. The four conditions included: Fast presentation/high points Fast presentation/low points condition Slow presentation/high points condition	Teacher behaviors: NA Fidelity of implementation: evaluated using direct observation <i>Social validity:</i> NA	No functional relationship was found for performance accuracy: percentage correct data indicated slight differences in performance accuracy between presentation rate, not consistent within or across subjects; no difference in percentage correct related to point delivery rate.
		<i>Slow presentation/low points</i>		
		<i>Continuum of reinforcement:</i> Token economy and contingent and/or specific praise statements		
		<i>Type of OTR:</i> Mode(s) of OTR		
		Single-student response, choral response	Student behaviors: • Correct responses (DO) • Incorrect responses (DO) • No response (DO)	Across all three experiments, a functional or causal relationship was not documented for correct responses. The amount of learning by students appeared equivalent across both conditions.
Wolery, Ault, Doyle, & Gast, 1992	Three experiments: all single-subject design (alternating treatments) Public school (level not specified; ages 10-13 years) SPEID All students with ID	Choral responding condition: all students responded to the presentation of a prompt Individual responding condition: a specific prompt was given and the request for response was delivered to one student	Teacher behaviors: NA Fidelity of implementation: NA <i>Social validity:</i> NA	
		<i>Continuum of reinforcement:</i> NA		

Notes: EBD is emotional and/or behavioral disorders; OHI is other health impairment; ESL is English as a second language; LD is learning disabilities; TBI is traumatic brain injury; ID is intellectual disabilities; DD is developmental disabilities; SPED is instruction lead by a special education teacher in a self-contained classroom; OTR is opportunity to respond; NA is not applicable; DO is direct observation; PP is permanent product; RS is rating scale; RC is response card; HR is hand raising.

<b>Table 2.</b>	
<b>Phase 1 Inclusion Criteria</b>	
Category	Inclusion Criteria
Participant population	<ul style="list-style-type: none"> <li>• K–12 students (with and without disabilities)</li> </ul>
Setting	<ul style="list-style-type: none"> <li>• Classroom</li> <li>• Group context with 2 or more students</li> </ul>
Independent variable(s)	<ul style="list-style-type: none"> <li>• Intervention focused on general classroom management (i.e., 4 or more components of evidence-based classroom management as defined by Simonsen et al., 2008<sup>a</sup>)</li> <li>• Intervention focused on specific practices in classroom management (i.e., 1–3 components of evidence-based classroom management as defined by Simonsen et al., 2008<sup>a</sup>)</li> </ul>
Dependent variable(s)	<ul style="list-style-type: none"> <li>• Student outcomes (academic and behavioral)</li> </ul>
Research design	<ul style="list-style-type: none"> <li>• Group experimental</li> <li>• Group quasi-experimental</li> <li>• Experimental single subject</li> </ul>

*Note:* A topic screen was conducted after the initial abstract review to determine if articles determined to be eligible for inclusion focused only on ways to actively engage students, including rates of OTRs, various types of OTRs (e.g., response cards), peer tutoring models (e.g., CWPT, TCPT, CLG), and so on.

<sup>a</sup>Simonsen et al. (2008) define five critical features of evidence-based classroom management that include: (a) maximizing structure; (b) post, teach, review, monitor, and reinforce a small number of positive state expectations; (c) actively engage students in observable ways; (d) establish a continuum of strategies to acknowledge appropriate behavior; and (e) establish a continuum of strategies to respond to inappropriate behavior.

Hunter, 2011; McKenzie & Henry, 1979), increased active student responding (Haydon et al., 2010 Kamps et al., 1994), increased academic achievement (Kamps et al., 1994; McKenzie & Henry, 1979; Sindelar et al., 1986), increased correct responses (Kamps, 1994), decreased off-task behavior (Haydon et al., 2010, and decreased disruptive behavior (Haydon et al., 2010). One study, Wolery et al. (1992), found no documented functional relation between type of response (choral vs. individual) and academic or behavioral outcomes. Studies in this subsample represented students in both general and special education.

Two studies within this group explored variations on simple choral versus individual responding. Haydon et al. (2010) found that a mixed response condition (i.e., 30% individual and 70% choral

TD-OTRs) resulted in slightly better outcomes than choral responding alone. Kamps et al. (1994) compared the effects of an OTR-rich enhanced small-group instruction package (i.e., choral responding, student-to-student responding, frequent rotation of materials, and randomly selected individual student responding) on the behaviors of students and found that the greatest correct responses occurred during choral response and student-to-student response. Overall, the majority of the studies focusing on the comparison of unison to individual student responding support the benefits of providing all students with verbal and nonverbal choral OTRs.

The other studies ( $k = 5$ ) that explored TD-OTR modality focused on unison responses requiring students to write (i.e., response cards) or manually enter (i.e., SRS) responses. All four studies comparing the use of response cards with traditional hand raising (i.e., single student responding to a question posed to the class) noted positive academic and behavioral outcomes for students in the response-card condition, including: increased correct responses (Davis & O'Neill, 2004; Gardner et al., 1994), increased student responding (Gardner et al., 1994; Lambert et al., 2006; Narayan et al., 1990), increased academic achievement (Davis & O'Neill, 2004; Gardner et al., 1994; Narayan et al., 1990), decreased off-task behavior (Davis & O'Neill, 2004), and decreased disruptive behavior (Lambert et al., 2006). Three of these studies occurred in the general education elementary setting. Only one study took place in a self-contained special education middle school classroom (Davis & O'Neill, 2004). Blood (2010) compared the use of SRS to traditional individual response on students within the general education setting. Although authors note increases in response rates for students during the use of SRS, no functional relation was detected for student on-task behavior or academic achievement (as measured by daily quizzes or end-of-phase test scores).

Overall, evidence from studies requiring students to manually create their responses (i.e., response cards and SRS) mirrored findings of other studies examining TD-OTR modality (verbal and nonverbal choral responding) showing positive impacts on the behavior and academic achievement of all students with and without disabilities. Further, studies measuring social validity indicate that students reported favoring unison responding conditions and feeling like they learned more during those conditions (e.g., Davis & O'Neill, 2004; Gardner et al., 1994).

#### *Differential Effects of Varying Teacher Rates of OTR Presentation*

Four studies (Carnine, 1976; Sterling et al., 1997; Sutherland et al., 2003; West & Sloane, 1986) specifically explored the impact of increasing rates of TD-OTRs on student outcomes. All four studies

found positive effects on student academic and behavioral variables measured as a result of faster rates of TD-OTR presentation. (Note, in these four studies individual students were presented with TD-OTRs at a faster rate versus unison response conditions present in other studies.) Positive results included: decreased off-task (Carnine, 1976) and disruptive behavior (Sutherland et al., 2003; West & Sloane, 1986) and increased participation (Carnine, 1976), time on-task (Sutherland et al., 2003), correct responding (Sutherland et al., 2003; West & Sloane, 1986), and learning of academic content (Sterling et al., 1997). Three were conducted in special education settings, and one took place in a general education setting. Overall, studies that focused on increasing the rate of TD-OTR presentation generally showed that faster presentation led to favorable outcomes for students with and without disabilities and that brief one-to-one skill instruction with performance feedback was associated with teachers increased use of this practice.

Although none of the 15 studies focused on differential effects of specific TD-OTR rates (e.g., meaningful differences in student outcomes when TD-OTRs are presented at a rate of 3.00 per minute versus 5.00 per minute), we were able to garner descriptive information about rates of TD-OTRs presented within studies that demonstrated positive outcomes for students. For example, during the optimal condition (i.e., active student responding), Sterling et al. (1997) presented students with approximately 40 TD-OTRs during a 15-minute observation session, equating to an average rate of 2.67 OTRs per minute. Similarly, Sutherland et al. (2003) set a goal for teachers to increase their TD-OTR rates during intervention to 3.00 per minute, and participating teachers exceeded this criterion during intervention, presenting an average of approximately 3.50 TD-OTRs per minute (from a naturally occurring mean of 1.68 per minute during baseline). West and Sloane (1986) increased response rates by varying how many TD-OTRs teachers presented per minute. In the fast condition, teachers presented approximately 4.00 OTRs per minute. Descriptive information from these four studies indicates that desired student outcomes occurred with the presentation of approximately 3.00–5.00 TD-OTRs per minute.

Studies examining unison versus individual responding ranged in OTR presentation rates, yet choral responses greatly increased the overall number of opportunities available for each individual student to respond. Treatment integrity data from Haydon et al. (2010) showed that all teachers were able to implement OTRs across conditions with an average rate of approximately 4.50–5.00 per minute. Similarly, teachers in Haydon and Hunter's (2011) study met or exceeded the 3.00 per minute criterion. In the study by Kamps and colleagues (1994),

individual OTRs for each student increased on average during the enhanced small-group instruction condition from less than 1.00 per minute to approximately 1.50 per minute or more. The findings from these studies demonstrate positive student outcomes for verbal or nonverbal (i.e., gestural) choral response at a rate similar to individual student response (i.e., 3.00–5.00 TD-OTRs presented per minute).

Across the studies assessing the impact of response cards and the SRS, OTR rates reported are relatively similar between individual and unison responding conditions. Despite this general similarity, a slight decrease in OTR presentation is noted during unison responding conditions. However, as noted earlier, during unison responding all students were presented with a chance to respond, so the overall number of responses per student was greater. During response-card conditions, researchers noted varying rates of TD-OTRs, ranging from 0.89 (Lambert et al., 2006) to 1.20 per minute (Blood, 2010; Narayan et al., 1990), with one study reporting a moderate rate of 0.99 per minute (Gardner et al., 1994). Overall, TD-OTR rates ranged from approximately 3.00 to 5.00 per minute for studies focused on increasing the rate of TD-OTR presentation or those employing verbal or gestural unison response modalities. In contrast to the studies examining increased rates of TD-OTR presentation and unison response, studies that required students to manually generate a response (i.e., write or type a response), provided lower rates of opportunities to respond (i.e., approximately 1.00 per minute). When interpreting these results it is important to note that studies at the secondary level are lacking, and differences in elementary and secondary curriculum may affect optimal rates of TD-OTRs in those settings. Similarly, research has not documented optimal OTR rates for various formats (e.g., drill format) and content areas (e.g., mathematics versus science) of instruction.

### Discussion

This review of literature sought to answer three distinct questions about class-wide TD-OTRs research. The discussion of results is framed around each individual question.

#### *What Are the Characteristics of the Empirical Literature Examining Class-Wide TD-OTRs?*

This systematic review yielded a sample of 15 studies, nine more than Sutherland and Wehby's (2001) review. Although the literature base remains limited in size, studies included a relatively equivalent representation of studies focusing on students with ( $k = 8$ ) and without ( $k = 7$ ) disabilities. Given the variety of students included in the sample and the associated positive outcomes, implementing increased and

varied TD-OTRs in a class-wide setting appears supported. Although student disability status (i.e., special education status or general education status) was similar across studies, there was little variation in the school level of study settings. Only three studies represented high school ( $k = 2$ ) and middle school ( $k = 1$ ). However, these studies did demonstrate positive student outcomes. Similarly, the majority of the 12 studies conducted at the elementary level also yielded positive results. The overrepresentation of elementary settings presents a restriction on the generalizability of outcome results across settings, but generally indicates positive results in elementary schools and tentatively positive results in middle and high schools. Further research across varied contexts including secondary and alternative school settings is needed.

*What Are the Differential Effects of Varying the Modality of TD-OTRs Presented on Student Behavior and/or Academic Performance?*

Results of this review indicate that providing students with class-wide unison TD-OTRs (i.e., verbal and nonverbal choral response opportunities) results in more positive academic and behavioral outcomes for students with and without disabilities than individual TD-OTRs. This finding echoes those of Simonsen et al. (2008), confirming that unison response modalities lead to more positive student outcomes. Although studies did not compare specific modes of unison responding (e.g., gestural choral responses versus response cards), the majority of studies within this sample suggest that any type of unison response format may be more effective than individual responding. Thus, future research should focus on exploring whether differences exist between different modalities of unison TD-OTRs.

Finally, only one study in the sample (Haydon et al., 2010) empirically tested the differential effects between mixed responding (i.e., 30% individual responding, 70% choral responding) and single modality response conditions (i.e., choral response only or individual response only). This study found that conditions containing choral response always lead to greater student gains than individual responding only, but that mixed responding was slightly more effective. The findings of Haydon et al. (2010) and Kamps et al. (1994) suggest that combining various types of TD-OTRs may positively impact student outcomes. To date these are the only two studies comparing different modalities. Further research is needed to determine the optimal combinations of TD-OTR modalities that lead to positive student outcomes. In sum, providing all students with class-wide unison TD-OTRs appears to lead to positive student outcomes. Although there may be differential impacts based on modality of unison response (i.e., response cards

vs. gestural responding) or the combination of modalities employed, these differences have not been examined.

*What Are the Differential Effects of Varying the Rate of TD-OTRs Presented on Student Behavior and/or Academic Performance?*

All studies exploring the impact of increasing the presentation rate of TD-OTRs demonstrated positive outcomes for students with and without disabilities, including: (a) decreases in off-task and disruptive behavior and (b) increases in correct responses, student participation, and on-task behavior. These findings mirror those of Sutherland and Wehby (2001) and support the findings of Lewis et al. (2004) and Simonsen et al. (2008). Due to the limited number of studies in this review and in prior reviews and the lack in variety of experimental designs employed, the continued investigation of increased rates of class-wide TD-OTRs is necessary.

In addition to understanding the impact of increased teacher presentation and various modalities of TD-OTRs on student outcomes, the literature has not identified the optimal rate of TD-OTRs for effective classroom management. To date, no studies have conclusively examined differential effects of specific rates of TD-OTRs or the possibility of ceiling effects (i.e., saturation), particularly within the context of class-wide delivery. Sutherland et al. (2003) detail the guidelines outlined by the Council for Exceptional Children (CEC) in their 1987 report of best practices for teachers of students with high-incidence disabilities:

During instruction of new material, teachers should elicit four to six responses per minute from students, who should in turn respond with 80% accuracy. During independent practice, students should make 8–12 responses per minute, with 90% accuracy (CEC, 1987). Eliciting frequent responses from students allows the teacher to adjust the lesson based on student feedback, increase the quality of the lesson, and increase the attentiveness of students. (p. 240)

These guidelines, which were among the first and only published recommendations for the desired rate of TD-OTRs, suggest a rate of approximately 8.00–12.00 OTRs per minute. Yet, it is important to note that this recommendation refers to teachers of students with high-incidence disabilities typically teaching functional communication or basic fact concepts (e.g., letter and number identification) in a drill format. Therefore, this rate may be too high for teachers providing other types of class-wide direct instruction.

Results of this review identified that TD-OTR rates during direct

instruction of basic facts (e.g., the presentation of flash cards with sight words) during optimum conditions (i.e., the response condition associated with positive student outcomes) ranged from approximately 3.00 to 5.00 TD-OTRs per minute. These rates fall below the guidelines set fourth by the CEC (1987). One reason for this may be that different populations of students (i.e., students without disabilities or students with other types of disabilities) participated in these studies. However, since positive impacts were noted for students receiving drill-style instruction within these studies, it may be that slightly lower rates than suggested by the CEC are still optimal. This is a cautious recommendation, as the aim of these studies was not to establish an optimal rate. Thus, future research should compare the differential impacts of TD-OTR rates during drill instruction.

Stichter, Lewis, Richter, Johnson, and Bradley (2006) suggested an optimal rate of 3.5 TD-OTRs per minute during active direct instruction. To confirm their recommendation, Stichter et al. (2009) conducted a descriptive study to examine teachers' classroom-management procedures and instructional practices associated with TD-OTRs. A total of 35 classrooms across four elementary schools participated in the study. They found that the average TD-OTRs was 2.62 per minute (1.95–3.27 OTRs per minute). These results indicate that naturally occurring rates of TD-OTRs in the general education setting may approximate, yet fall slightly below, 3.50 per minute.

Further, several studies in this review demonstrated that teachers were able to either meet or exceed a rate of 3.00–3.50 OTRs per minute using either increased presentation or unison response (e.g., Haydon & Hunter, 2011; Sutherland et al., 2003), and positive outcomes occurred at these rates. However, in conditions where students used unison response modalities that required writing (i.e., response cards) or the use of a clicker (i.e., SRS) response rates ranged from 0.89 to 1.20 per minute. Similar to the studies with higher response rates, these studies also indicate improved student outcomes. Therefore, it may be possible that depending on the modality of student responding, a slower presentation rate is as effective as a faster presentation rate. Again, this review yields only descriptive information, and future research should focus on establishing how many TD-OTRs are optimal for each modality.

### *Limitations*

There were three major limitations to this review. First, although we used a replicable systematic review process to identify eligible material across multiple electronic databases in conjunction with backward and forward searches, it is possible that relevant studies



were not reviewed. The initial database search yielded few studies, presumably as a result of the restrictive Boolean search; however, the addition of the backward and forward search increased the likelihood that the search was comprehensive. Still, some relevant studies may have been missed.

Second, no measure of study quality was used to evaluate key study components (e.g., strength of experimental design, appropriate measurement, inclusion of social validity measures). However, the goal of this review was to yield descriptive information about the current literature base, not evaluate the quality of the empirical evidence. Due to the relatively small sample size ( $k = 15$ ), exclusion of studies based on quality would have minimized the ability to garner meaningful information from the literature base. Thus, as the research base grows, future reviews of literature should focus on the inclusion of study quality measures.

Finally, with the exception of one study (McKenzie & Henry, 1979), all studies in the sample employed a single-subject research design and the majority of studies occurred in elementary school settings. Thus, further research across varied contexts, especially at the middle and high school level, as well as different study designs (e.g., experimental group design) would help to diversify the empirical support for increasing rates and modalities of opportunities to respond and provide causal evidence of increased TD-OTR effectiveness.

### *Suggestions for Practice*

Findings of this review have practical implications for teachers educating all students within general and special education classroom settings. Most importantly, studies confirm that how teachers deliver OTRs may impact students' academic achievement and behavior. Research suggests that by increasing the rate of TD-OTR presentation and varying the modality, teachers can support student gains regardless of disability status. To increase the rate of OTRs presented, teachers should target periods of direct instruction when they are reviewing basic facts or concepts and increase the number of OTRs presented to students to multiple times per minute (i.e., a rate of approximately 3.00–5.00 OTRs per minute). To increase the number of chances each student is able to respond, teachers can employ unison response modalities, such as choral response using gestures (e.g., thumbs up/down, hand raising), response cards, or computer-assisted responding (e.g., the SRS). These response modalities can easily replace existing traditional responding by simply varying the modality of the questions that the teacher typically asks during direct instruction. When using unison response modalities requiring students to write

(i.e., response cards), the rate of TD-OTRs presented may decrease to 1.00 per minute to give students ample time to answer.

### Conclusion

This review extends the support for TD-OTRs as an effective class-wide management strategy resulting in increased academic achievement and desired changes in student behaviors (e.g., Conroy et al., 2008; Lewis et al., 2004; Simonsen et al., 2008). Although further research is needed to examine the effects of increasing class-wide TD-OTRs across relevant contexts and to determine the differential effects of TD-OTR modalities, the current empirical evidence supports positive academic and behavioral outcomes of increased TD-OTRs across students with and without disabilities.

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