January 2013

Effects of Response Cards on the Disruptive Behavior of Students

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by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
Department of Child and Family Studies
College of Behavioral and Community Sciences
University of South Florida

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Date of Approval:
June 24, 2013

Keywords: behavioral skills training, active learning, white boards, positive behavior support, tier-two intervention

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Abstract

This study examined the effects of response cards (RC) on student disruptive behavior, responding, and accuracy of responding during whole-class guided-reading instruction in a first-grade classroom. The authors combined two baseline conditions with an alternating treatments design and then replicated the effects across four teacher-nominated students. The first baseline condition was the teacher's typical instruction format, where one student who raised his/her hand was called upon to respond to the teacher's question. The second baseline condition (BL') was the same as the first baseline with an additional control for the number of teacher-delivered questions to the class per session. The RC condition was the same as BL' except students were expected to write their answers on the laminated card and then display upon the teacher's cue. Response cards and BL' conditions were alternated each session. The results revealed that RC implemented by a classroom teacher did reduce students' disruptive behaviors and increased their responding and accuracy during class.

Chapter One: Introduction

Although evidence-based interventions have been shown to be effective in modifying student behaviors, teachers within educational systems may not implement these recommended strategies. Evidence-based decisions are the federally mandated norms for providing services to all students today, and teachers are finding themselves with increasing challenges to maintain these requirements while supporting inclusion (Individuals with Disabilities Education Improvement Act, 2004; No Child Left Behind Act, 2001). Recommendations include ongoing student progress monitoring through data collection procedures, positive classroom management strategies, and adherence to state-mandated curriculum standards. Morin (2001) points out that "teachers have been holding their collective fingers in the dyke of an under-resourced school system, keeping the flood waters of questionable change at bay while preserving what they perceive to be truly 'good' about public education" (p. 62). The increasing demands for teachers to include children with a broad range of challenging behaviors into their classrooms require increasing supports for teachers to manage classrooms effectively and efficiently. The literature may support a treatment package to increase classroom management procedures but teachers must also be accepting of these packages for change to sustain.

School-Wide Positive Behavior Support (SWPBS) is becoming a preferred framework in school systems to bring evidence-based interventions to practice while supporting teachers through the process (Ross, Romer, & Horner, 2012; Thompson,

2011). PBS involves the application of the basic principles of applied behavior analysis to prevent and/or decrease problem behaviors while increasing pro-social behaviors (Carr et al., 2002; Horner et al., 1990). Within this framework, interventions are implemented on a universal, secondary, and/or tertiary level. SWPBS emphasizes system level change in promoting whole-school wellness within the educational system (Carr et al., 2002; Sugai, Horner, & Gresham, 2002). These practices provide a positive and effective alternative to the traditional methods of discipline and are intended to assist schools in establishing positive cultures.

Multi-tiered system support is another term for describing this framework that uses evidence-based problem solving to integrate academic and behavior instruction and interventions for all students. This integrated instruction and intervention is delivered to students in varying intensities (i.e., multiple-tiers) based on student need. While research has demonstrated the benefits of PBS approaches on increasing positive changes in school environments, challenges to maintain adoption of these practices in the classroom are evident (Bambara, Nonnemacher, & Kern, 2009; Cappella, Reinke, & Hoagwood, 2011; Lohrmann, Forman, Martin, & Palmieri, 2008; Sugai et al., 2002). Implementation of these practices consistently remains a challenge and some teachers may be unwilling to utilize recommended strategies (Cappella et al., 2011; Morin, 2001). These changing practices consider the student as part of the educational system in need of change rather than considering the student as a source of the problem.

Several studies have attempted to understand the resistance in adopting effective evidence-based practices within an educational system (Bambara et al., 2009; Frey, Park, Browne-Ferrigno, & Korfhage, 2010; Lohrmann et al., 2008; Ross et al., 2012). These

studies have used methods of semi-structured interview formats (Bambara et al., 2009; Lohrmann et al., 2008), surveys (Ross et al., 2012), and focus group interviews (Frey et al., 2010) as a means of qualitatively assessing barriers from consultants' and teachers' perspectives. Direct observation data and interview data help researchers understand why recommended procedures are being abandoned once the experts or researchers are no longer providing guidance. Philosophical differences, lack of administrative support, the culture of the school, and a lack of teacher support on how to implement effective classroom management practices were common reasons teachers abandon evidence-based strategies (Bambara et al., 2009).

One study surveyed 184 teachers across 40 elementary schools to examine the relationships between outcomes of teacher well-being (including burnout and efficacy) and the implementation fidelity of SWPBS (Ross et al., 2012). They compared two groups of schools; those that implemented SWPBS with high fidelity and those that did not. They found less teacher burnout and higher teacher efficacy in teacher-reports from schools that implemented SWPBS with high fidelity, especially in areas that included students with low socio-economic status. These findings suggest positive effects on student and teacher outcomes, a facilitator to treatment integrity and maintenance, if change efforts are mastered. A strong school leadership team, administrative support, and additional classroom management support were some of the facilitators that accounted for reinforcing teachers' high fidelity. Schools implementing SWPBS will likely find these elements in place. When teachers' efforts of adopting evidence-based practices are reinforced through the improved academic and behavioral performance of their students, these efforts will more likely persist in the future.

One of the most effective strategies to promote a positive classroom environment is through the use of effective classroom management techniques (Newcomer, 2009; Noell, 2008; Randolph, 2007). A comprehensive classroom management plan includes effective behavioral, instructional, and environmental management strategies (Newcomer, 2009). Instructional management involves using appealing and structured teaching methods as an antecedent for students' task engagement. When a teacher increases a student's opportunity to respond, they will also be increasing the student's engagement with the instruction. This increase in opportunities to respond could also serve as a competing response for students to engage in problem behaviors.

Active student responding has been demonstrated in the literature to provide students with more opportunities to respond to academic questions posed by the teacher, resulting in increases in students' engagement with instruction (Newcomer, 2009). Behaviorally speaking, when adopting evidence-based practices is first reinforced by administration and then reinforced by increases in students' academic and behavioral performance, teachers will be more likely to maintain these interventions over time (Bambara et al., 2009; Ross et al., 2012). When students are required to participate during instruction, the literature has demonstrated increases in responding, participation, and academics (Christle & Schuster, 2003; Kellum, Carr, Dozier, 2001; Narayan, Heward, Gardner, Courson, & Omness, 1990). Several strategies used to increase student responding include: peer tutoring, computer assisted instruction, choral responding, direct instruction, number heads together, and response cards (Newcomer, 2009).

One effective way to increase active student responding in the classroom is through the use of response cards during instructional periods. Response cards are

laminated dry-erase white boards, or preprinted cards, that students use to write answers to teacher-posed questions and then display simultaneously to the teacher during a particular lecture. Response cards have been empirically evaluated as an active instructional approach for over 40 years across pre-school (Godfrey, Grisham-Brown, Schuster, & Hemmeter, 2003), general education classrooms (Gardner, Heward, & Grossi, 1994; Maheady, Michielli-Pendl, Mallette, & Harper, 2002; Narayan et al., 1990; Wood, Mabry, Kretlow, Lo, & Galloway, 2009), and university classroom settings (Kellum et al., 2001; Marmolejo, Wilder, & Bradley, 2004; Shabani & Carr, 2004). During a typical instructional period, a teacher will present a question to the class, students will raise their hands to answer the question, and the teacher will then select one student to respond and receive feedback. In this learning trial example, one student actively responds to a teacher's question and receives feedback while the other children in the classroom are required to passively attend.

All literature reviewed for the current study primarily evaluated the effectiveness of using response cards in comparison to traditional hand raising during instruction to determine the effects on student participation, student academic performance and achievement, student disruptive behavior, student on-task behavior, as well as teacher variables. Response cards have been used across elementary school settings in subjects such as math (Armendariz & Umbreit, 1999), science (Maheady et al., 2002), social studies (Narayan et al., 1990), and English vocabulary (Munro & Stephenson, 2009). Preprinted response cards have been used in kindergarten classrooms to decrease students' off-task behaviors (Skibo, Mims, & Spooner, 2011), and in special education classrooms to increase students' accuracy of responding (Wood et al., 2009).

Narayan et al. (1990) evaluated the effects of using response cards during a fourth-grade social studies lecture in order to increase student participation. Traditional hand raising was compared to response cards using an ABAB reversal design. Dependent variables included teacher presentation rate, number of students' responses, accuracy of response, and daily quiz scores. During large-group instruction, six students were teacher-nominated to represent the whole-class' range of overall skill levels and only their responses were recorded. Results indicated that students were provided with more frequent opportunities to respond which resulted in higher rates of participation during the response cards condition. While accuracy of responses was similar in both conditions, 19 of the 20 students increased quiz scores from baseline to intervention during the response cards condition. Limitations to this study included experimenter-implemented procedures and a lack of maintenance data to assess academic improvements across time, both decreasing the generalization of their findings.

Another study evaluated the effects of response cards on frequency of active student responding, accuracy of response, and academic achievement as measured by next-day quizzes and bi-weekly tests during a fifth-grade science class (Gardner et al., 1994). In a successful attempt to replicate Narayan et al. (1990), this study extended the delay between instruction and testing to measure a maintained effect on academic achievement using an ABAB reversal design. The teacher nominated five students to represent the classes' range of academic performance and participation. Results indicated that students had higher levels of student responding in the response card conditions (i.e., 21.8 per session) as compared to the traditional hand raising condition (i.e., 1.5 per session). The delayed quiz and test scores also increased from baseline to treatment

conditions. Tests averaged 49% in the hand raising condition compared to 70% in the response cards condition, a 21% increase. While both experiments showed positive effects of using response cards, the authors of these studies implemented the intervention procedures rather than natural change agents; a limitation to the generality of findings.

Maheady et al. (2002) evaluated the effects of using response cards on students' performance in a sixth-grade science class. The authors selected the teacher in the classroom to implement all procedures throughout the study. The teacher had 27 years of experience teaching in a middle school and was known as an "instructional leader." An alternating treatments design was used to evaluate the effects of teacher-implemented response card procedures on academic outcomes. The study also focused on the impact of each instructional method upon teacher questioning and student responding patterns, as well as academic achievement as measured by quiz scores and a 37-item pre/post tests of science knowledge. Previous studies used scripted lessons and question formats, as well as structured procedures for using response cards, which may explain the low treatment integrity (Gardner et al., 1994; Narayan et al., 1990). The response card lectures did produce higher quiz scores and gains were also evident in the pre/post measures of science knowledge as scores increased from 20% to 78%. Student responding rates were higher in the response card lectures as compared to hand raising, thus extending the external validity of using response cards to increase academics.

Munro and Stephenson (2009) extended measures to student and teacher behaviors using an ABAB reversal design to evaluate the effects of using response cards during vocabulary instruction in a fifth-grade inner-city classroom in British Columbia. While the type and quality of teacher feedback were not recorded, results did find more

feedback was provided in response card conditions as compared to traditional hand raising conditions. Test scores increased for all students from the hand raising conditions to response cards conditions and increased again for 3 of 5 students during the second phase of intervention. A decline in scores was reported when a return to baseline was implemented. A lack of data recording on accuracy of student responses is a limitation to the study as test scores remained low (i.e., less than 80%) during each phase. Students could have been writing wrong answers on the cards but were still scored as actively responding. Future research would need to examine the accuracy as well as the frequency of responding to ensure students are increasing responses as well as mastering the academic material.

Christle and Schuster (2003) examined the benefits of using response cards during a fourth-grade math lesson. Five students were selected for data collection due to their low-to-high range of academic skills, participation rates, and on-task behaviors; they were deemed representative of the classes' average skills. An ABA design was used to evaluate the effects of response cards on the number of student-initiated response opportunities, number of student responses, weekly quiz scores, and time on-task. Results indicated that response cards were effective in increasing active participation, academic achievements and on-task behavior. Unfortunately, an ABA design is a weak demonstration of experimental control because it fails to replicate the intervention phase.

Few studies reviewed addressed the effects of response cards on decreasing disruptive behavior. Disruptive behavior has been defined in the literature as any instance of yelling, talking to peers, throwing objects, interrupting the teacher, and/or leaving their assigned seat without permission (Conyers et al., 2004; Lambert, Cartledge,

Heward, & Lo, 2006). Disruptions often require teachers to redirect individual students, resulting in a loss of instructional time (Newcomer, 2009). Armendariz and Umbreit (1999) sought to determine whether response cards would decrease the occurrence of disruptive behavior during instruction in a third-grade math class using an ABA reversal design. The entire class of 22 students was measured using a time sampling recording system. The experimenter would scan the room once at the end of each 2 min interval in a predetermined order following a seating chart. Each session lasted 20 min providing 10 opportunities to score each child. Results found every student had a lower percentage of intervals with disruptive behavior during the response card condition. Limitations to the study include a lack of social validity data and a weak experimental design. By systematically replicating these effects on social behaviors, an extension of the generality of findings may be demonstrated.

Lambert and colleagues (2006) evaluated response cards across two fourth-grade math classrooms. Using an ABAB reversal design, they measured the effects on nine students' disruptive behaviors and responding. Researchers used a more conservative method of 15 s partial interval recording of disruptive behaviors (i.e., 10 s to observe, 5 s to record). During the response card condition, decreases in disruptions and increases in responding were reported. An interview held with both teachers and students of this study using eight open-ended questions (e.g., "which way of answering did you like best?") revealed teachers' reported that the use of response cards were shown to have a positive effect on students' academic and disruptive behaviors and that the procedures were easy to administer. Students reported that they enjoyed using the response cards and felt response cards helped them learn better. Limitations to the study include a lack

of assessment data and no quantitative data on the social validity of intervention. Since research has demonstrated that evidence-based practices maintain when procedures are perceived to be acceptable and effective by natural change agents, it is important to assess the social validity of interventions quantitatively. This will help to maintain lasting effects at the classroom level, a potential secondary intervention within a multi-tiered framework.

Today's mandates for inclusive educational environments have resulted in a broad range of challenging behaviors, which will require an increase in supports for teachers to manage classrooms effectively and efficiently (Morin, 2001; Newcomer, 2009). Because response cards have been shown to increase on-task behavior and academic responding, it is also likely that these effects will supplement SWPBS currently in place within an educational system. Since research has found that more feedback was provided in response card conditions, as compared to traditional hand raising conditions, it is likely that this increased amount of feedback will reinforce students' efforts to participate during instruction; rather than disrupt the class. Students whose problem behaviors are maintained by social positive reinforcement may benefit from this increased amount of feedback.

Research is needed to evaluate the effects of using response cards as a secondary intervention on a group of teacher-nominated students emitting disruptive behaviors within an existing framework of universal PBS. Some empirically evaluated examples of secondary supports include Check and Connect (i.e., dropout prevention program), Behavior Education Program (i.e., daily check-in and check-out), First Steps to Success (i.e., intended for kindergarten students needing additional prosocial skills training),

Social Skills Training (i.e., directly teach small groups prosocial skills), and Mentoring Programs (e.g., Big Brothers Big Sisters) (Hawken, Adolphson, Macleod, & Schumann, 2009). Some of these programs require community members to monitor student progress while others require school consultants to implement. This requirement may decrease the efficiency of the interventions for classroom teachers.

When students are actively engaged in instruction, their opportunities to emit disruptive behaviors may be decreased. By evoking high levels of responding from all students during instruction, an increase in active student responding and engagement will result. When teachers' efforts of implementing evidence-based interventions are reinforced through increases in students' academic and behavioral outcomes, they may be more likely to engage in intervention efforts in the future. When teachers spend classroom time correcting student behavior, it results in a loss in instructional time.

The literature has not examined disruptive behaviors in the context of being unresponsive to universal supports of PBS. This extension will serve as a foundation for evidence of response cards as a potential secondary intervention for students who are unresponsive to universal supports within a multi-tiered framework. Therefore, the purpose of this study was to extend the literature of PBS by examining the effects of response cards as a secondary intervention on students' a) disruptive behavior, b) amount of responding, and c) accuracy of responding during teacher-delivered instruction. Quantitative social validity measures examined teacher perceptions of the procedures' efficiency and effectiveness.

Chapter Two: Method

Participants

This study was conducted in a first-grade general education classroom during a guided reading academic time period. One classroom teacher was selected to participate based on willingness to partake in the study as well as having a class with at least three students who emitted disruptive behaviors during the same academic time period. The female teacher was Caucasian, certified in elementary education, and had 13 years of teaching experience; however, she had been on leave for the last five years and this was her first year teaching in this classroom.

Sixteen students participated in this study; however, only four teacher-nominated students' behaviors were selected for data collection. The four students (3 male, 1 female) ranged in age from 6-7 years old. While both instructional strategies (i.e., the teacher's current hand raising strategy, response cards) were applied to the entire class, only the disruptive behaviors of the target teacher-nominated students were recorded. The teacher nominated these students because she felt they were the most disruptive and/or least responsive during the guided reading routine. Target students were described as being out of their seat during the entire instructional period (i.e., student 1), calling out during instruction and/or playing with objects in their desks (i.e., student 2), sleeping during instruction and/or not participating (i.e., student 3), as well as talking to peers (i.e., student 4). The primary investigator (PI) of the study verified these nominations during

direct assessments to ensure students emitted disruptive behaviors at a high enough frequency to record data (e.g., approximately one disruption per 10 min).

Setting

All assessments, trainings, and intervention procedures were conducted in the teacher's classroom. The classroom contained four pods of desks, four desks to each pod. One student (i.e., participant 1) was seated in the back of the room at a desk by himself; a preventative approach to decrease his opportunities to emit disruptive behaviors. All observations, student training, and intervention sessions were conducted within the natural environment of the classroom during normal academic times and routines. The teacher delivered instruction from the front of the room using an overhead projector (i.e., ELMO) during the guided reading routine.

The school serves over 700 multi–ethnic students, pre-K to fifth-grade, from an economically disadvantaged community. As of 2010, 33% of students were Hispanic, 22% were Black, 39% were White, 1% were Asian, and 5% were Multi-Racial. Florida uses School Grades to measure overall performance of a school each year on the Florida Comprehensive Assessment Test (FCAT), based on three criteria: overall performance on FCAT, percent eligible students who took the test, and whether or not students made progress in reading and math. Based on the three criteria, the school received a grade of C by Florida Department of Education (FDOE) in 2010-2011. In 2012, the school rated below state average in writing (72% / 81%), reading (47% / 59%), math (40% / 58%), and science (29% / 51%).

The school had been implementing School-Wide Positive Behavior Supports (SWPBS) since 2008 and had a strong system of universal (i.e., tier-one) supports in

place. The school had a PBS leadership team who was responsible for monthly reviews of all tier-one data (e.g., academic, behavior). This multi-disciplinary team represented all stakeholders (e.g., administration, teachers, school psychologist) on site. The PBS team was responsible for developing behavioral curriculum, designing and overseeing tier-one interventions, evaluating progress, and training school staff. The school also had a process for teachers to submit a request to the team for additional classroom PBS systems.

Informed Consent

The primary investigator of the study prepared forms to obtain teacher informed consent, parental informed consent, and a verbal student assent script. The institutional review board and school district approved all consent and assent forms/scripts.

Teacher informed consent. Once the classroom was identified, the PI provided an informational packet during her 30 min planning period. During this brief (i.e., 15 min) face-to-face meeting, the PI reviewed the packet with the teacher. This packet contained a description about the purpose of the study; procedures involved, and explained how the lecture format would be similar with the addition of response cards. The PI explained that she was selected as a potential participant based on school data, her request for supports with classroom management strategies, and that participation was absolutely voluntary. It was also explained to her that additional classroom management strategies would be provided if she were to choose not to participate in the research. The teacher was provided with one week to review the packet. The teacher also received an informed consent form in the package, which was reviewed verbatim, and asked to

complete and return to the PI if she agreed to participate in the study within the one week timeframe.

Parental informed consent. Once the classroom teacher agreed to participate, an informed consent form was sent home to all students' parents, notifying them that the class was participating in a research project during the teacher-selected academic area (i.e., guided reading). The form explained to the parents how the research was comparing the teacher's regular education instructional strategy to this active instructional strategy using response cards. Parents were provided with an option to get more information about the research from the PI and/or teacher by selecting the option on the letter and returning the letter to the teacher. The parents that agreed participate in the research returned the form with their signatures of approval. The form notified parents that the teacher had selected to use both of the teaching methods in class and; therefore, their child would experience both teaching methods. The parents were provided with one week to review the form and could contact the PI of the study at any time via cell phone or email with questions about the study and or their child's voluntary participation. Parents neither asked that their child not participate in the research, nor asked for additional information about the study. All target students' parents returned consent forms prior to data collection.

Student assent. Once target students' parental permission forms were received, the PI obtained verbal assent (i.e., the student verbal assent script) from all students. As a way to minimize coercion and undue influence, the script was short and simple. Students were informed about the procedures in terms that they could easily understand and were

asked vocally if they would like to participate. All students agreed to participate by chorally responding "yes."

Assessment

The PI conducted indirect assessments with support from the school's PBS team, and independently conducted direct assessments. The team used tier-one data (e.g., minor problem behavior referrals submitted by location, time of day, teacher; office discipline referrals per student) and teacher referrals to identify potential classroom participants. Based on the school's data, the PBS team provided the PI with a list of potential participants whose classrooms were in need of tier-two supports (i.e., secondary supports). The first teacher on the list agreed to participate in the study. The school's PBS team provided the other potential participants with an informational packet describing evidence-based PBS systems to improve their classroom management concerns.

Indirect assessment. Upon obtaining teacher informed consent, the teacher met with the PI before school to discuss the specific classroom management issues she was experiencing and to nominate target students who, in her opinion, displayed mild disruptive behaviors (e.g., calling out, out of seat) during whole-class instruction. Students could also be nominated if they had poor academic achievement (e.g., low grades) or a reluctance to respond to teacher-posed questions as these behaviors were considered competing academic responses. Students who emitted more severe disruptive behaviors (e.g., aggression, property destruction, self-injury) were excluded from participation as these behaviors required a more intensive behavioral assessment and

intervention (i.e., tertiary levels of support). All students were exposed to the conditions even though data were only collected on the four target students' behaviors.

Upon receiving parental informed consent, the PI conducted a functional assessment interview with the teacher using the Problem Behavior Questionnaire (Lewis, Scott, & Sugai, 1994). This form helped to structure the interview format and focus questions towards each target student's occurrence of disruptive behaviors in the classroom. This form was also useful to identify an academic area of instruction that was most difficult for the teacher to actively engage students. The PI conducted the interview using a face-to-face format following student dismissal in the afternoon.

The results from the 15-item Problem Behavior Questionnaire (PBQ) are displayed in Figure 1. Upon administering the PBQ, the teacher was asked to focus her responses on a typical occurrence of a student's disruptive behaviors. When interpreting the results from the PBQ, a hypothesis about the function of the problem behavior may be determined (Lewis et al., 1994). On the PBQ, the first group of items focuses questions towards a possible social positive reinforcement function and the second group of items focuses questions towards a possible social negative reinforcement function. A third group of items looks at the influence, if any, of setting events. Frequency ratings ranged from 0 (*never*) to 6 (*always*) with respect to how often the disruptive behavior occurred. Any item scored at a three or above is a potential function of students' problem behavior. Results determined that the primary functions of students' problem behaviors were in result of gaining access to attention from both the teacher (i.e., students 1-3) and peers (i.e., student 4). The PI confirmed these results during initial direct observations. Setting

events seemed to increase the reinforcing value of only one student's problem behavior only (i.e., student 1).

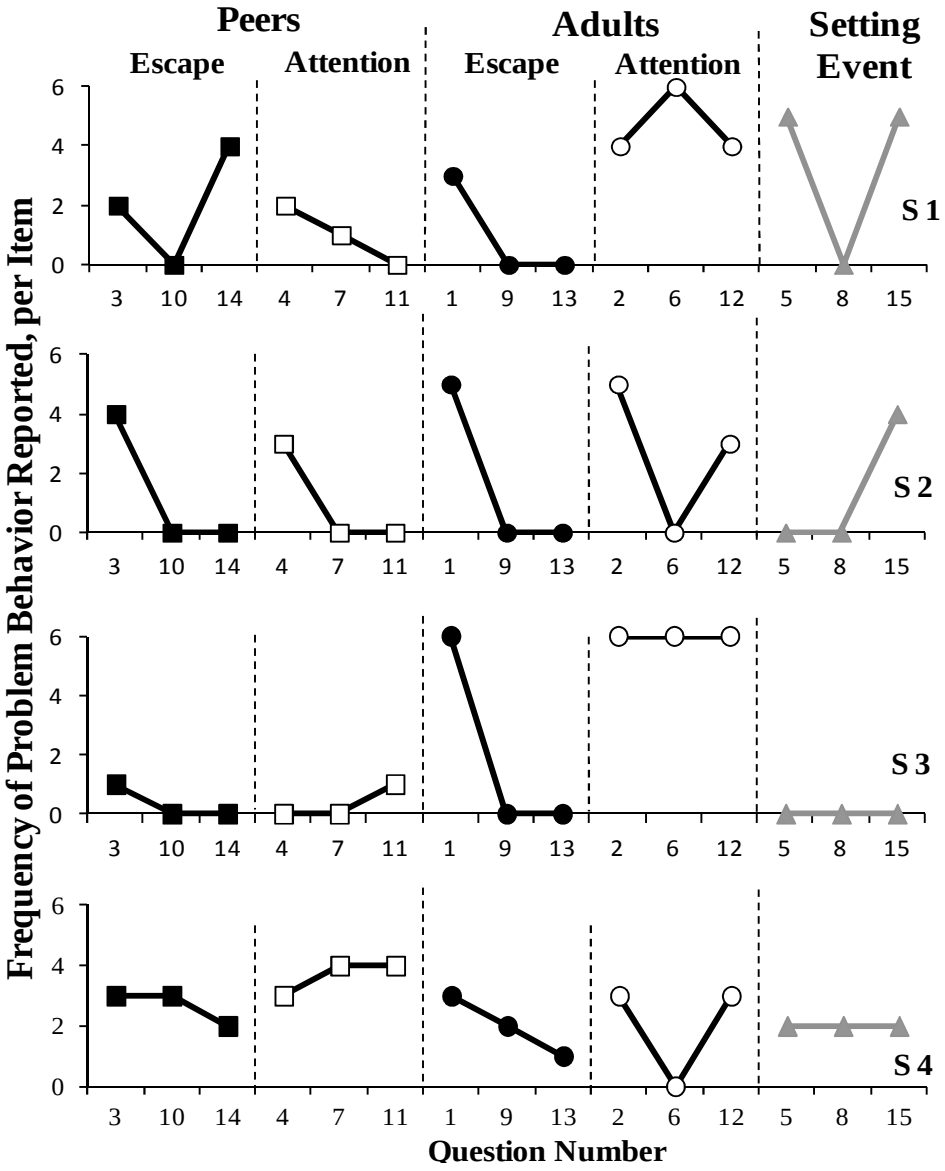

Figure 1. Individual results from the Problem Behavior Questionnaire. The above graph represents individual results from the Problem Behavior Questionnaire across target students (S 1-4).

Direct assessment. The PI then conducted direct observations following the teacher interview to confirm teacher-nominated students emitted disruptive behaviors at high enough frequencies to record data (e.g., approximately one disruption per 10 min).

Antecedent-behavior-consequence data were also recorded for three sessions, no less than 30 min each session, to help define the disruptive behavior of each target student. The definitions were reviewed with the teacher to ensure accuracy of each student's target behavior. Results are discussed below in the disruptive behavior section, in terms of operational definitions.

Materials

The PI provided all necessary materials to be used during the intervention phase of the study. Materials included 20 response cards (9"x6" dry-erase white boards), dry-erase crayons, and felt erasers. Materials were presented by the teacher, PI, or student helper at the beginning of each lecture, collected at the end of lecture, and stored in the classroom. At completion of the study, the materials were donated to the classroom.

Dependent Variables and Data Collection

The primary investigator was the primary observer of the study and sat in a corner of the classroom in clear view of all teacher-nominated students. Three dependent variables were measured throughout this study: a) disruptive behavior, b) percentage of student responses, and c) accuracy of responses. The primary observer recorded data during all sessions using a MotivAider ™ (i.e., vibrating pager) to signal each 5 s interval. Students' disruptive behaviors were recorded during one half of the instructional period and the percentage and accuracy of students' responding were recorded during the second half of the lecture. Observation sessions of disruptive behaviors and student responding were counterbalanced to ensure a full picture of both behaviors could be captured. For example, day one involved data recording of students' disruptive behaviors during the first half of lecture, students' responding during the

second half; day two involved data recording of students' responding during the first half of lecture and disruptive behaviors during the second half. Research was conducted 2-5 times per week during the same lecture period (i.e., guided reading) as selected by the teacher. The lecture period varied from 32-42 min depending on the level of difficulty and length of time needed to cover the content.

Disruptive behavior. Target disruptive behaviors included talking to peers during instruction, laying head on desk, out of seat, throwing objects, interrupting the teacher during instruction, and any other competing academic responses as determined from the initial observation. During teacher-delivered instruction, the expectation for students was to sit in their seat (i.e., bottom seated in chair, feet on ground) with eyes facing forward (i.e., eyes on the teacher, eyes on the task).

Disruptive behavior was defined as students either out of seat (e.g., physically out of their chair without the teacher's permission; dangling upside down in seat; seated on knees; out of assigned seat), calling out (e.g., verbal outburst heard from across the room without permission from the teacher and/or verbally or physically interrupting the teacher [e.g., yelling out "teacher…teacher"; walking up to the teacher and pulling on her clothing] during instruction), playing with objects (e.g., throwing objects, banging objects on surfaces, and/or manipulating objects during instruction), talking to peers during instruction without permission from the teacher, inappropriate gestures (e.g., laying head on desk, flailing arms, tongue out, covering ears), and/or refusal to work (i.e., noncompliance to begin work within 10 s).

Based on the recommendation of Lambert and colleagues (2006), disruptive behavior was measured using a 5 s partial interval (5 s PI) recording system (see

appendix A). By reducing the duration of the partial interval observations from 10 to 5 s, a more accurate snapshot of the amount of time students were disruptive was expected. Each target student was observed for 1 min using 5 s intervals during the lecture. This time sampling procedure is considered to be representative of the behavior during the entire time period from which data are collected (Cooper, Heron, & Heward, 2007).

Target student one was observed for 1 min, then target student two, three, and so on until each student was observed for a minimum of 48 intervals (4 min). The order of student observations was varied each session to ensure data would reflect student behavior across the entire instruction period. Behaviors were recorded using a plus/minus (i.e., +/-) system where a plus represented observed disruptive behavior and a minus represented zero disruptive behaviors during each interval. Data were calculated by dividing the total number of pluses by the total number of intervals observed and multiplying by 100 for a percentage.

Student responding and accuracy of response. During the other half of instruction, the percentage of intervals observed with student responding (hand raise plus vocal response during baseline and baseline prime lectures and textual responses during response card lectures), and accuracy of student responding was also observed and recorded by the primary investigator. A checklist-recording sheet was used (see appendix B) during each phase of the study. Within each instructional interval, the observer(s) circled a letter H for hand raise, V for verbal response, T for textual response (i.e., written), and a plus (i.e., +) or minus (i.e., -) for accuracy next to each target student. The teacher defined correct and incorrect responses during the lecture. The total number of responses (i.e., hand raise, hand raise plus vocal response; raising the response card)

were summed and divided by the total number of questions asked and then multiplied by 100 for a percentage. The total number of correct responses were also summed and divided by the total number of responses per student and then multiplied by 100 for a percentage.

Inter-observer Agreement

One undergraduate and one graduate student studying in applied behavior analysis were trained as secondary observers. The PI trained the research assistants on data recording procedures for student disruptive behavior, active student responding (ASR) (i.e., academic response, accuracy of response), as well as treatment integrity. A behavioral skill training session (i.e., information, modeling, rehearsal, feedback) was used to instruct the assistants how to collect data. The PI provided information about each student's target disruptive behavior and information on how to score each data sheet. The PI then modeled each student's disruptive behavior and provided the assistants with an opportunity to rehearse scoring while receiving immediate feedback on areas of strength and areas to improve during role-plays.

Inter-observer agreement (IOA) was collected for at least 33% of all conditions. During IOA checks, the PI and the research assistant sat in clear view of each target student and independently recorded disruptive behaviors and the percentage and accuracy of student responding across all conditions. A free interval recording application (i.e., Seconds ^{TM}) downloaded to an iPhone was used during each IOA session to signal the 5 s interval for data collectors. Both observers shared an ear bud to hear the audible tone every 5 s during disruptive behavior recordings only. When recording the disruptive behavior portion of each session, the PI used a 10 s countdown to signal the beginning of

each IOA recording session. During the ASR recordings, observers recorded data for 15 min using the clock.

IOA was calculated as the percentage of agreement on the occurrence of the students' behavior, using an interval-by-interval method. Agreement was defined as both observers using the same code (i.e., H, V, T, +, -) for the corresponding interval. Any codes scored differently in the same interval were defined as a disagreement. The formula for determining the percentage of agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100 for a percentage (A / A + D x 100).

Results of IOA checks during disruptive behavior recordings averaged 94% (range = 89% - 97%) across all three conditions. IOA was collected during 40% of the BL condition (n = 5 sessions), with an average agreement of 95% (range = 93% - 97%) during the recording of disruptive behaviors and 100% during the recording of responding and accuracy. For the BL' condition, IOA was collected 33% of all sessions (n = 6) with an average agreement of 97% (range = 96% - 97%) during the disruptive behavior recording and 100% during the responding and accuracy recording. For the treatment condition, IOA was collected for 50% of the BL' lectures and 33% of the RC lectures. During the BL' sessions/lectures in the treatment condition, agreement was calculated at 92% (range = 89% - 94%) for the disruptive behavior recordings and 100% for the responding and accuracy recordings. For lectures using RC in the treatment condition, agreement was 93% during all disruptive behavior recordings, and 100% during all responding and accuracy recordings.

Experimental Design

An alternating treatments design with two baseline conditions (i.e., baseline, baseline prime) was used to evaluate the effects of response cards on student disruptive behavior, student responding, and accuracy of response. Because the focus of the study was to evaluate the effects of intervention on four individuals' behaviors, this single subject design was most appropriate for answering this research question. Some advantages of using this design are that extraneous variables should affect both conditions similarly and the potential for sequence effects should be minimized (Cooper et al., 2007). Using single subject designs allow each participant to serve as his or her own control (Cooper et al., 2007). The BL' and RC conditions were rapidly alternated across daily sessions. Experimental control was demonstrated when the data paths for BL' and RC conditions showed no overlap with each other and either stable levels or opposing trends (Cooper et al., 2007). Further strength of experimental control was demonstrated by replicating these effects across students. To prevent predictability of the order, the final five sessions were randomized. Randomization allows one to draw inferences about the intervention's effects that are not confounded by predictability factors, and will help to rule out threats to external validity (i.e., multiple-treatment interference). Five pieces of paper were thrown in a hat (i.e., 3 BL', 2 RC) and then selected without replacement to determine the condition for the last five sessions.

Procedures

The teacher implemented all of the intervention procedures during her selected subject area (i.e., guided reading) that had high occurrences of student disruptive behavior. All conditions were conducted during the same academic routine. The

material from the curriculum was not affected, only how students responded to the teacher's questions (i.e., hand raising, response cards). The guided reading lectures throughout the study included topics about how to differentiate between fact/opinion, fantasy/reality, pronouns, and suffix/prefix.

Baseline. Baseline consisted of the teacher's typical hand raising instructional method, utilizing a question and answer format where students were expected to raise their hands in response to the teacher's questions and await the teacher to call on them to respond. During this phase, the primary investigator (PI) recorded the number of questions asked per one half of the lecture and an average number of questions (i.e., 16) asked per lecture were calculated.

Baseline prime. The initial baseline condition was followed by a second baseline condition known as baseline prime (BL'). The PI and the teacher met in the classroom, after school, to review the average number of questions that were posed during BL. A fixed number of 16 questions were decided upon based on the average number from BL, and the teacher used self-monitoring procedures (i.e., tally sheet) to ensure fidelity. By holding the number of questions posed constant, a control for variability in levels of disruptive behaviors due to an inconsistent number of questions asked per phase (i.e., BL', RC vs. BL') was expected.

Response cards. Prior to each lecture, the teacher generated content questions to be used during the response card condition. Content questions were developed using the teacher's selected textbook and adhered to state guidelines for specific grade level proficiency requirements. All teacher-posed questions were delivered vocally and repeated upon student request.

Questions contained a combination of true/false, multiple-choice, and/or one or two word short answers. At the start of lecture, the teacher, PI, or teacher-selected student helper would pass out response cards to each student. This served as a cue for students to differentiate between conditions. The teacher would present a question to the class and then the students would respond by writing a one or two word answer on their response cards, displaying their cards immediately upon the teacher's request, and then awaiting teacher feedback. An instructional interval consisted of a teacher-posed question, a pause for student responding (e.g., 30 s), followed by the teacher's visual scan of student responses and feedback to the entire class (e.g., "I see we all answered the question correctly," "most of you seem to understand the question," "perhaps we need to review this question").

Steps for each instructional interval during RC condition included: 1) vocally present the question to the class (e.g., "Skateboarding is good exercise. Write F for fact or O for opinion."), 2) provide adequate wait time for students to use the response card (e.g., enough time for the majority of all students in the classroom to respond), 3) request students to present their cards (e.g., "3, 2, 1, show me"), glance around the room at each card with no individual feedback provided, 4) vocally reveal the answer to class (e.g., "That statement is a fact, if you wrote F for fact you got the answer correct."), and 5) provide praise statement for using response cards correctly and/or correct answer (e.g., "Great job answering everyone", "I like how everyone used their cards responsibly"). Students were given a warning if inappropriate behavior while using the RC was observed. A warning occurred only once for student one (i.e., session 21), and twice for student two (i.e., sessions 21 & 23). If the behavior continued, the RC was removed for

5-10 seconds. This removal occurred one time for student one (i.e., session 21) and one time for student two (i.e., session 23). The two inappropriate behaviors observed were propping feet on the desk and subsequently knocking the desk over (student 1), and bouncing in chair while seated on knees (student 2).

Teacher training for baseline prime. Following BL, the PI and the teacher met after school and reviewed the average number of questions asked during the guided reading true baseline session. A fixed number of questions (i.e., 16) were decided upon based on the average per session in baseline and agreed upon by the teacher. The teacher used self-monitoring procedures (i.e., tally sheet) to ensure accuracy of number of questions asked per session.

Teacher training for using response cards. Following BL', the PI met with the teacher for 20 min after school to conduct response card training. The PI utilized behavioral skills training (BST) to provide instructions, modeling, rehearsals, and feedback to the teacher on how to use the RC procedures. A rationale was first provided to the teacher about the benefits of using active responding techniques, specifically response cards. The PI first explained how to use the procedures, then modeled how to use response cards during lectures, provided the teacher with an opportunity to rehearse while receiving immediate feedback on areas of strength and areas to improve during role-plays. The teacher demonstrated the correct procedures with 100% accuracy prior to implementation and within 15 minutes.

Student training. The PI used similar BST procedures to train the students on how to use response cards during a different academic routine (i.e., spelling) prior to the first intervention session. The PI instructed students to write their answers on the

response cards, display the answers upon the teacher's cue, and await the teacher's feedback. Students watched the PI and teacher demonstrate how to use the response cards, and then were provided with an opportunity to rehearse the skills while receiving immediate feedback.

During rehearsal, the PI presented a question to the class (e.g., "spell cow") and asked students to respond by writing the answer on their cards and then covering their answers. The PI then instructed the students to show the answer with a 3, 2, 1 countdown (i.e., "3, 2, 1, show me") and praised the class for using the cards responsibly. Student training occurred for one session (i.e., 30 min), and all students demonstrated knowledge of using procedures without verbal prompting to comply.

Treatment Integrity

The procedures for measuring treatment integrity were similar to those used in the Lambert et al. (2006) study. The research assistant conducted treatment integrity checks for at least 50% of all intervention conditions to ensure that the teacher was following the structured format for conducting the intervention (see appendix C). If integrity fell below 100%, the PI provided positive and corrective feedback before the next intervention session. Modeling and rehearsal was utilized as refresher training. A checklist was used for fidelity measures, outlining the necessary steps for implementing the response cards during each instructional interval. Treatment integrity was calculated by dividing the number of steps performed correctly by the total number of steps and then multiplied by 100 for a percentage.

The research assistants recorded the teacher's behavior during 50% of all intervention sessions (n = 6). Treatment integrity was calculated to be 86% (range = 76%

- 99%) across three total sessions. Due to the low treatment integrity (76%) from Session 14, the PI began collecting the teacher's self-monitoring form at the end of each week. Probes were then conducted during Session 16 and Session 23 and found a steady increase in fidelity from 83% to 99% of the RC lectures. The teacher only reached 100% fidelity during trainings.

Social Validity

Procedures for measuring social validity were similar to Lambert et al. (2006) using open-ended questions. As an extension to these measures, this study also included additional questions based on a 5-point Likert scale to yield quantitative along with qualitative outcomes (see appendices D & E). A separate student and teacher survey format was issued to the class following completion of the study. At the end of the study, the teacher handed out the brief questionnaire to the students and only those who returned consent forms were obtained. The students were requested to return the questionnaire to the teacher before school dismissal that same day. The teacher survey was administered via email immediately following completion of the study with a request to return the survey within one week.

Results from the social validity questionnaires of the students who returned their informed consent forms (n = 9) revealed most students preferred to answer the teacher's questions using response cards (67%). When asked if they would like to use RC in other classes, 67% of students responded yes. When asked what students liked best about using RC, 67% responded they liked writing answers on the board. One student responded raising the board was the best, another student stated erasing the board. When asked what students liked the least about using RC, 57% said nothing, one student said it

took awhile and another student said the crayons were hard to erase. A 5-point Likert scale was also used to determine the grade a student would give their experience using RC. The scale ranged from A (*I really liked using response cards*) to F (*I hope we never use response cards again*) and 67% of students rated their experience using A, 22% rated their experience using B, and only one student scored an F to rate their experience.

The teacher's questionnaire ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Results from the teacher's social validity questionnaire revealed that the she strongly agreed: that the procedures were easy to use, that she would continue to use RC during guided reading, that she plans to use the RC during other subject areas, that students answered more questions correctly when using RC, and that a decrease in students' disruptive behaviors were observed during lectures utilizing response cards. When asked what was the best part of implementing RC in her classroom, she replied there was "more student engagement." When asked to grade her experience with using RC during lectures, she responded by scoring the letter A (*Very useful instructional approach*).

Chapter Three: Results

The individual results for disruptive behavior for each student participant are shown in Figures 2-4, and the average response and accuracy across all four students are displayed in Figures 5-6. The data in Figure 2 represents the individual student's percentage of intervals observed with disruptive behavior during baseline (BL), baseline prime (BL'), and treatment (BL' vs. response card) conditions. During the first baseline condition, the disruptive behaviors of all four students were at high levels (range = 42% - 100%). The mean percentage of intervals observed with students' disruptive behavior was 75% (range = 59% - 97%). During the second baseline condition, the levels of students' disruptive behaviors remained high (range = 63% - 100%). The mean percentage of intervals observed with students' disruptive behavior was 83% (range = 74% - 94%), a slight increasing trend overall. During the treatment condition, BL' levels of all students' disruptive behavior remained similar to those seen in first baseline (range = 40% - 100%) and response card (RC) levels of disruptive behavior were consecutively low (range = 0% - 42%) for all four students. During the treatment condition, the mean percentage of intervals observed with disruptive behavior during BL' was 76% as compared to 12% when the teacher utilized RC during lectures.

Data in Figures 3-4 represent individual student hand raises, responses, and accuracy across all three conditions. Average student responding during the BL (mean = 8%, range = 0% - 32%) and BL' (mean = 4%, range = 0% - 8%) conditions were low.

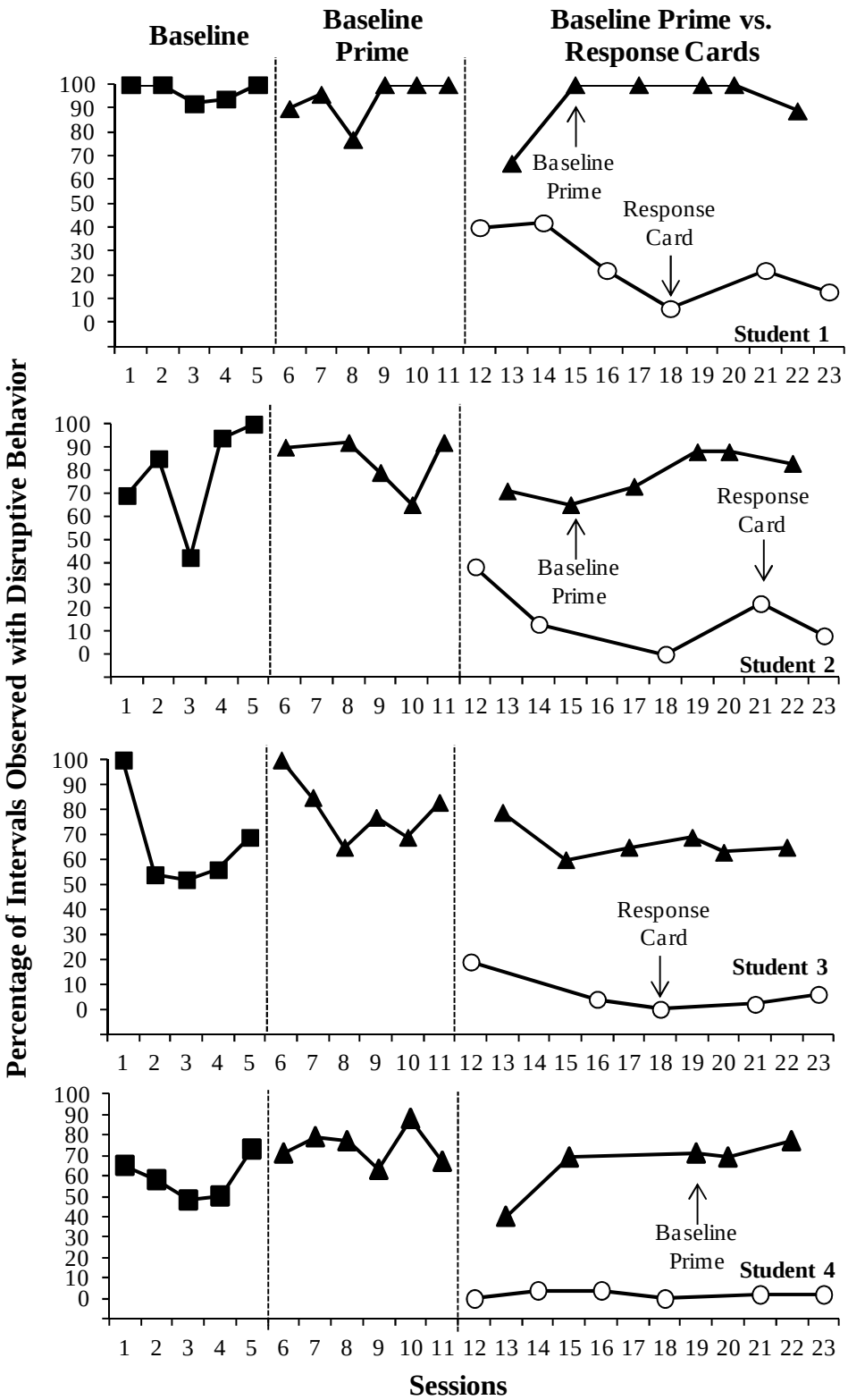

Figure 2. Percentage of intervals observed with disruptive behavior. The above graph represents the percentage of intervals observed with individual student disruptive behavior, per one-half of the session (i.e., 4 min/student, dispersed across 15 min sessions), across all conditions.

During treatment, responding increased only during lectures utilizing RC (mean = 98%, range = 89% - 100%) as compared to traditional lectures in BL' (mean = 5%, range = 0% - 10%) that utilized hand raising. While the average accuracy of students' responses was variable throughout all conditions, a clear separation in the treatment condition between the two data paths is evident. Accuracy of responding was higher during the RC sessions.

Data in Figures 5-6 represent the average responding and accuracy across all four students. In both baseline conditions, average levels of student responding remained low (BL range = 0% - 32%; BL' range = 0% - 8%). During the treatment condition, average levels of student responding remained low during the lectures utilizing hand raising (range = 0% - 10%), and high during lectures utilizing RC (range = 89% - 100%). Average student accuracy during both baseline conditions was variable (BL range = 0% - 58%; BL' range = 0% - 33%), but levels remained much lower than in treatment condition (RC range = 81% - 97%; BL' range = 0% - 50%) with zero overlapping data points.

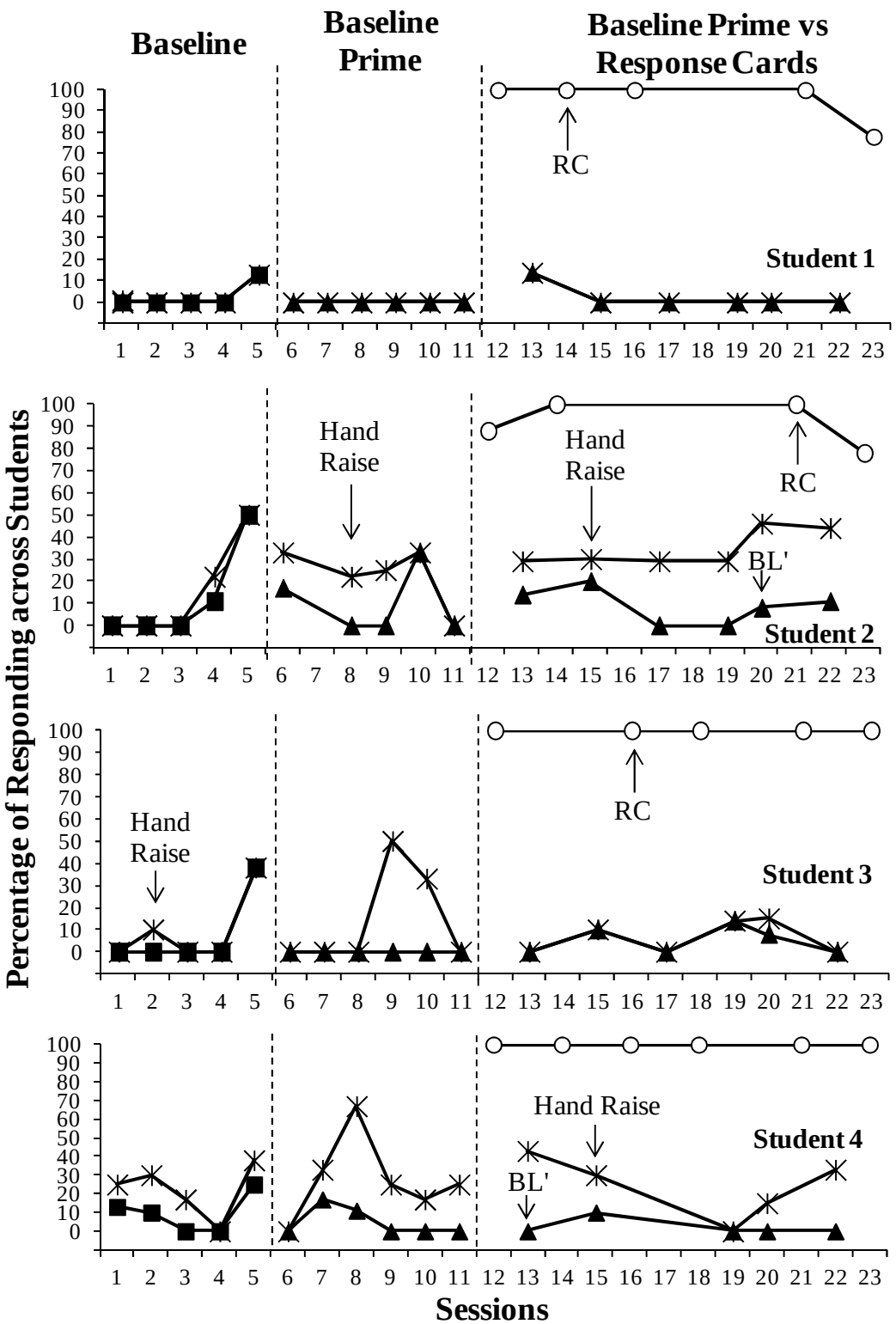

Figure 3. Percentage of intervals observed with hand raises and responses. The above graph represents the percentage of intervals observed with individual student hand raises and responses (HR + vocal-verbal response; textual response) to teacher-delivered questions, per one-half of the session (i.e., 4 min/student, dispersed across 15 min sessions), across all conditions.

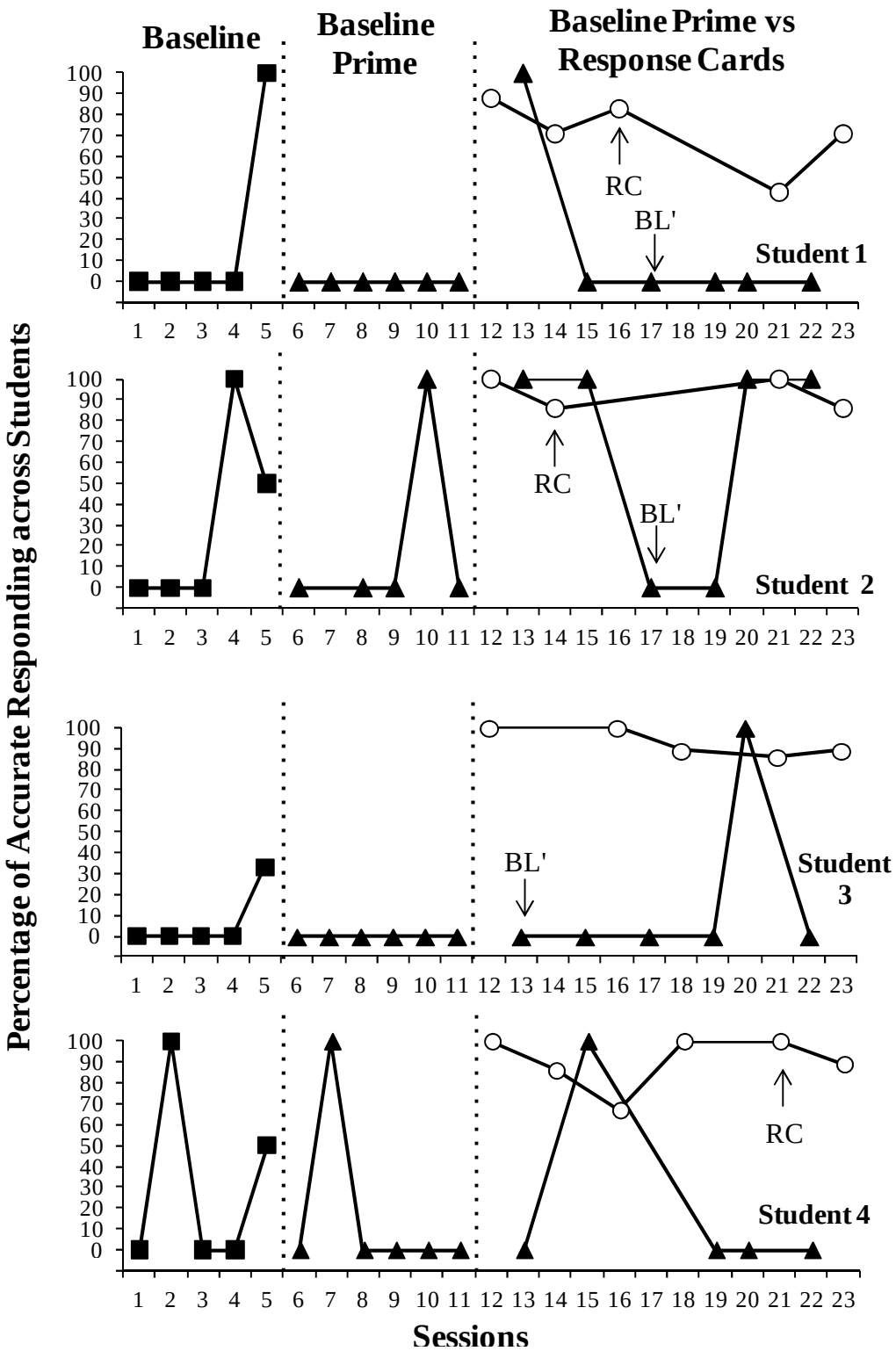

Figure 4. Percentage of individual student accurate responding. The above graph represents the percentage of individual students' accuracy of responding to teacher-delivered questions across all conditions, per one-half of the session (i.e., 4 min/student, dispersed across 15 min sessions).

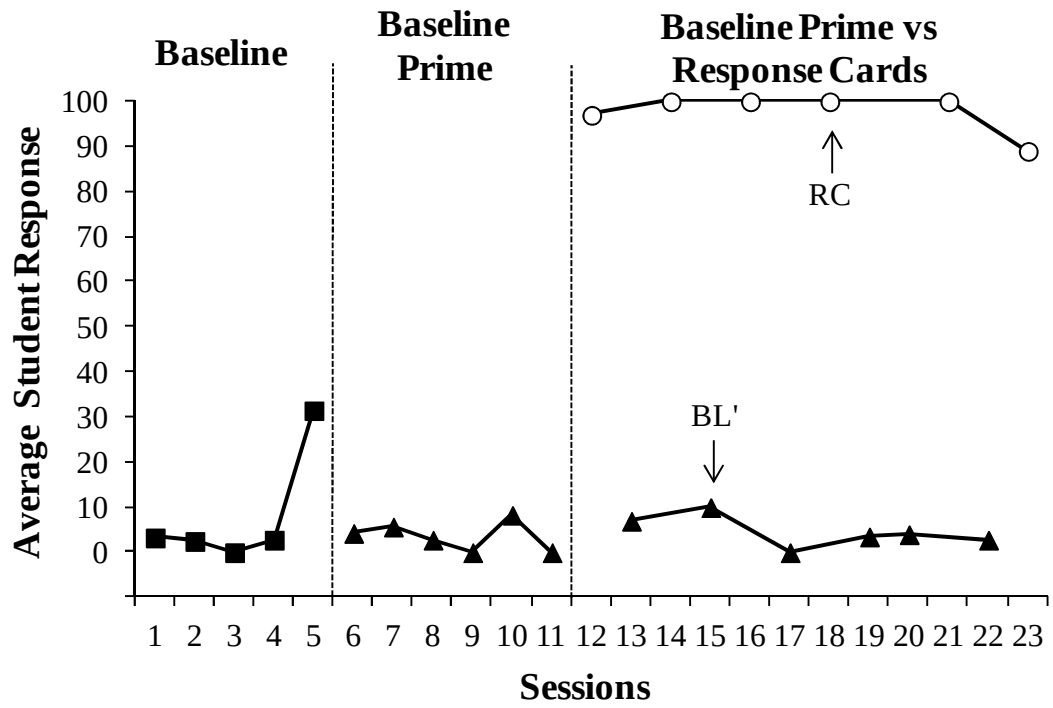

Figure 5. Average student response. The above graph represents the average response of target students, per one-half of the session (i.e., 4 min/student dispersed across 15 min sessions), across all conditions.

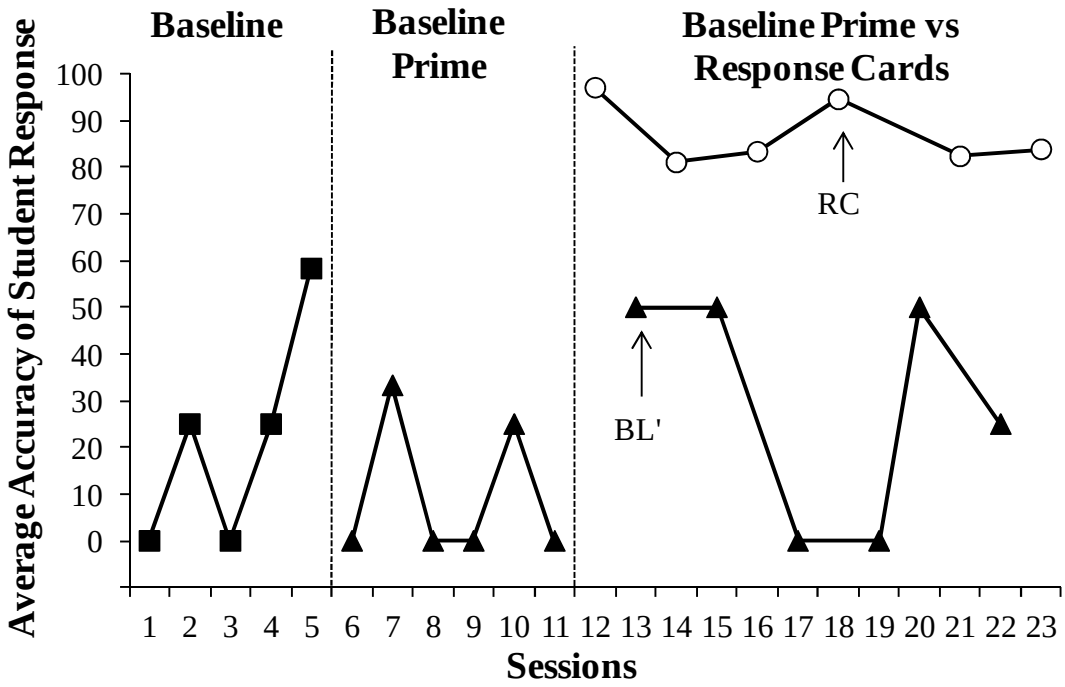

Figure 6. Average accuracy of student responding. The above graph represents the average accuracy of student responding, per one-half of the session (i.e., 4 min/student dispersed across 15 min sessions), across all conditions.

Chapter Four: Discussion

The purpose of the current study was to extend the science of teaching by examining the effects of response cards on a group of students' a) disruptive behavior, b) amount of responding, and c) the accuracy of responding during the teacher-delivered instruction. Quantitative social validity measures examined teacher perceptions of the procedures efficiency and effectiveness. These results showed that response cards implemented by a classroom teacher did reduce the disruptive behaviors while increasing the amount responding and accuracy of responding across all four teacher-nominated students.

During baseline conditions, the target students had moderate to high levels of disruptive behaviors (i.e., individual disruptions ranged from 40% - 100% of intervals observed during ½ of a 30 min session) and low levels of hand raising and active student responding. During intervention conditions, target students were less disruptive and more actively engaged due to the competing response nature of using the cards. Individual student responding was substantially higher in the sessions using response cards. Even though there are some overlapping data points in the accuracy data for each individual, it is evident that response cards consistently produced higher accurate responding.

These data provide a good argument that higher levels of student responding did serve as competing responses for disruptive behaviors. When students are required to

actively attend to a teacher's lecture, fewer opportunities arise for students to engage in problematic behavior. These results also support the use of response cards to increase student participation (Kellum et al., 2001). This was evident in student three's behavior, as he was observed sleeping through several baseline sessions. While his behavior was not blatantly disruptive, sleeping during class still required the teacher to pause her lectures to prompt the student to wake up.

These results also expand the utility of response cards used as a secondary intervention within the framework of School-Wide Positive Behavior Support. Ongoing student progress monitoring and positive classroom management strategies are some of the universal supports that are in place within a school that is implementing PBS (Ross et al., 2012). This framework supports the effectiveness of using response cards as a secondary intervention. Students who are unresponsive to universal supports will likely benefit from this secondary approach of using response cards during instruction to increase academic and social behaviors. A continuous schedule of reinforcement (i.e., teacher praise) delivered to the entire class for responding was an effective schedule to use while establishing new behaviors for the target students. Students who raised their hand and were not called on frequently (i.e., student two) were able to receive this positive feedback more often as a result of using response cards during class.

One example of establishing new behaviors is exemplified in student one's data. He was observed out of his seat for almost the entire class period during all baseline sessions. This behavior was extremely disruptive to the teacher, requiring her to pause lectures and correct the student's behaviors. This disruptive behavior had become such a nuisance to other students in the class that the students themselves began reprimanding

student one. He was even referred for additional tier-three services due to his behavior problems. It was impressive that a simple strategy of response cards reduced his disruptive behavior substantially. The teacher was surprised by this reduction and found it more useful than any of the tertiary suggestions that were provided by the Positive Behavior Support team (e.g., tickets delivered for appropriate behaviors; behavior contract). Whole-class involvement, where students respond simultaneously, allowed for everyone in the class to participate while receiving positive feedback.

There are a couple of limitations to be considered when reviewing the data. One limitation is the lack of follow-up data collected at the completion of the study. Due to time constraints (i.e., the end of the school year), we were unable to collect these data. Follow-up data would have allowed researchers to examine the lasting effects of the intervention after consultation efforts were over. Maintenance of the lasting effects from using response cards is an area of research that needs to be examined. Future studies should examine the long-term use of response cards on the social behaviors of students. Researchers should also examine the potential effects of using response cards during multiple subjects to determine the generality of findings.

Another limitation to the current study is the data collection procedures. The teacher's lecture ranged from 32-40 min, which provided about 16 min to record student responding and accuracy and 16 min to record student disruptive behaviors. Each student was observed for a total of 4 min (i.e., 48 intervals) dispersed across the 16 min observation window. While this provided limited intervals observed per student during the recording of disruptive behavior (i.e., 48 intervals), this is an improvement to the Armendariz and Umbreit (1999) study that used momentary-time sampling and provided

only 10 opportunities to score each child. Further experimental control was demonstrated in the current study when results were replicated across all students. Threats to external validity (i.e., multiple treatment interference) were controlled by randomizing the final five sessions; strengthening confidence in the results.

Future researchers should conduct a stronger functional analysis to understand more about the benefits of using response cards for students' behaviors that may be multiply maintained. The purpose of conducting the indirect assessment using the Problem Behavior Questionnaire was to learn more about the relationship between using response cards for a student's behavior maintained by escape versus a student's behavior maintained by attention. The literature supports an increased amount of teacher feedback in result of using response cards, suggesting this intervention is ideal for students whose behaviors are maintained by social positive reinforcement (Munro & Stephenson, 2009). While the use of response cards for escape maintained behavior has not specifically been studied, they may effectively serve as an abolishing operation; making the academic content less aversive and escape less reinforcing and any problem behavior that results in escape less likely.

This is the first known study to hold the number of teacher-posed questions constant. This is an important control that should be examined further. It is not known how many teacher-delivered questions are required per lecture to produce similar effects on active student responding (i.e., if a teacher only asked 10 questions per a 30 min academic routine, would similar results be observed). Future research should conduct an analysis to learn more about the number of questions required for response cards to be an effective intervention.

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Appendices

Appendix A: Disruptive Behavior Recording Sheet

Date: ____________

Observer's Initials: ________ Start Time: ______ End Time: ________

Instructions: Within each interval, please record a plus (i.e., +) for disruptive behavior observed or a minus (i.e., -) for no disruptions next to each target student.

Seconds / Student	0-5s	5-10s	10-15s	15-20s	20-25s	25-30s	30-35s	35-40s	40-45s	45-50s	50-55s	55-60s
1												
2												
3												
4												

Seconds / Student	0-5s	5-10s	10-15s	15-20s	20-25s	25-30s	30-35s	35-40s	40-45s	45-50s	50-55s	55-60s
1												
2												
3												
4												

Seconds / Student	0-5s	5-10s	10-15s	15-20s	20-25s	25-30s	30-35s	35-40s	40-45s	45-50s	50-55s	55-60s
1												
2												
3												
4												

Seconds / Student	0-5s	5-10s	10-15s	15-20s	20-25s	25-30s	30-35s	35-40s	40-45s	45-50s	50-55s	55-60s
1												
2												
3												
4												

Appendix B: Student Responding and Accuracy Recording Sheet

Date: _____ Time: _____

Instructions: For each question, please circle a letter H for hand raises, V for verbal response, T for textual response, and a plus (i.e., +) or minus (i.e., -) for accuracy next to each target student.

Student / Question	Student 1	Student 2	Student 3	Student 4
1	H V T + -	H V T + -	H V T + -	H V T + -
2	H V T + -	H V T + -	H V T + -	H V T + -
3	H V T + -	H V T + -	H V T + -	H V T + -
4	H V T + -	H V T + -	H V T + -	H V T + -
5	H V T + -	H V T + -	H V T + -	H V T + -
6	H V T + -	H V T + -	H V T + -	H V T + -
7	H V T + -	H V T + -	H V T + -	H V T + -
8	H V T + -	H V T + -	H V T + -	H V T + -
9	H V T + -	H V T + -	H V T + -	H V T + -
10	H V T + -	H V T + -	H V T + -	H V T + -
11	H V T + -	H V T + -	H V T + -	H V T + -
12	H V T + -	H V T + -	H V T + -	H V T + -
13	H V T + -	H V T + -	H V T + -	H V T + -
14	H V T + -	H V T + -	H V T + -	H V T + -
15	H V T + -	H V T + -	H V T + -	H V T + -
16	H V T + -	H V T + -	H V T + -	H V T + -

Appendix C: Treatment Integrity Recording Sheet

Date: _____ Time: _____

Instructions: Please indicate if steps were performed during each instructional trial by placing a plus (+) to indicate step complete and minus (-) to indicate step not complete. An instructional trial begins with a teacher posed question and ends with a subsequent answer reveal plus praise.

1. Teacher presents question to the class.
2. Teacher provides adequate wait time for students to use response card (e.g., enough time for all students in classroom respond).
3. Teacher requests students to present their cards (e.g., "cards up").
4. Teacher reveals the answer to class.
5. Teacher provides praise statement for responses (e.g., "Great job answering everyone", "I like how everyone used their cards responsibly").

Question / Step	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Teacher question presented																
Teacher provided adequate wait time																
Teacher provides cue for students to display cards																
Teacher reveals answer																
Teacher provides praise statement																

Appendix D: Student Social Validity Questionnaire

1. Which way of answering questions did you like best, raising your hand or cards?
2. Would you like to use response cards in other classes?
3. What did you like best about using response cards?
4. What did you like least about using response cards?
5. What grade would you give your experience with response cards in class: Circle one.

A	B	C	D	F
I really liked using response cards	Response cards are just ok	I didn't care	I did not like using response cards	I hope we never use response cards again

Appendix E: Teacher Social Validity Questionnaire

1. The procedures used in this study were easy to use in my classroom:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

2. I will continue to use response cards during this subject area:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

3. I plan to use response cards in other subjects than the one currently used:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

4. When response cards were used, students answered more questions correctly:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

5. When response cards were used, I saw a decrease in disruptive behaviors during lecture:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

6. What was the best part of implementing this intervention in your classroom?
7. What was the worse part of implementing this intervention in your classroom?
8. What could be done differently to have teachers implement these procedures?
9. What grade would you give your experience with response cards: Circle one.

A	B	C	D	F
Very useful instructional approach	Useful instructional approach	Neutral	Minimally useful instructional approach	Not useful instructional approach

9b. If a grade of C or lower was reported, please provide us with feedback on what made this instructional approach not useful in the classroom: