Errorless Classroom Management: Success-focused Proactive Intervention for Students with Challenging Behavior

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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Abstract

The current study investigated the use of Errorless Classroom Management (ECM), a proactive, success-focused approach to managing student challenging behavior. With this approach, we trained classroom staff in strategies for building two classroom management skill sets: on-task behavior (involving students’ ability to remain focused on and complete academic work) and acquiescent behavior (involving students’ ability to give in to the will of a peer when it is appropriate to do so as a means of enhancing peer relations). These behaviors were used as the focus of the intervention because they are considered keystone skills that can lead to broad improvements in other classroom behaviors that are not targeted during intervention.

Three teachers from two general classrooms and one special education classroom participated. They were observed throughout baseline and after training to determine whether their classroom management skills changed as a result of the training. As a means of evaluating the effects of the intervention on child behavior, we observed 9 students who exhibited significant behavioral and learning difficulties. Baseline observations of student and teacher behavior began simultaneously for all three classrooms.
Using a multiple baseline research design, the training intervention was introduced in a time-lagged manner such that intervention began first for Classroom 1, followed by Classroom 2, then by Classroom 3. Teachers were trained individually through a 1-hour workshop with performance feedback techniques and subsequent feedback sessions on a weekly basis. By the end of intervention, teachers’ use of reinforcement (i.e., praise, tangible rewards) and reactive approaches (i.e., reprimands) improved; however, no changes were evident in teachers’ use of antecedent approaches (i.e., building rapport, priming). All 9 students demonstrated substantial improvement in on-task and acquiescent behavior. Covariant improvement in student compliance to teacher requests was also evident. Follow-up at 3 months indicated that student treatment gains were maintained. Improvements in teachers’ use of reinforcement and reactive approaches were also sustained during follow-up at 3 months.

*Keywords:* classroom management, errorless approaches, behavior problems
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Chapter 1: Introduction

1.1 Student Problem Behavior and Teacher Stress

Studies estimate that approximately one in five students experiences challenges related to diagnosable internalizing or externalizing behavior problems (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Merikangas et al., 2010). Students with such difficulties present a host of challenges related to behavioral, academic, and social issues (Avramidis & Norwich, 2002; Esperat, Moss, Roberts, Kerr, & Green, 1999) as they are more likely to exhibit noncompliance, distractibility, impulsivity, off-task responding, and aggressive behavior in the classroom (Algozzine, Christian, Marr, McClanahan, & White, 2008; Harrison, Vannest, Davis, & Reynolds, 2012). These behaviors can reduce student access to instruction, interfere with academic progress (Barkley, 1998; Rosenberg, Wilson, Maheady, & Sindelar, 2004), and increase social problems with peers (Guevremont & Dumas, 1994; Rich, Loo, Yang, Dang, & Smalley, 2009). In the long term, serious disruptive behavior can lead to social maladjustment (Morrison, Furlong, and Morrison, 1994), violence in adolescence (Patterson, 1992), and school dropout (Castillo, Holmes, Cuccaro, & Gardner, 1997; Saraiva, Pereira, & Zamith-Cruz, 2011).

Managing disruptive behavior is a major source of stress for teachers in the classroom (Kyriacou, 2001). Teachers often feel that they lack the necessary training to deal with conduct problems (Giallo & Little, 2003; Liu & Meyer, 2005) and believe that they spend a disproportionate amount of time doing so (Cains & Brown, 1996). In a poll conducted in 1997 with over 4,000 teachers across the United States, 50% of teachers reported disobedience and 58% noted disruptive behavior as a problem in their school (Hardman & Smith, 2003). The stress of maintaining classroom discipline can be overwhelming for teachers (Martin, Linfoot, & Stephenson, 1999) and can decrease their sense of self-efficacy (Giallo & Little, 2003). Over time, such stress can lead to job dissatisfaction (Liu & Meyer, 2005), burnout (Ingersoll, 2001;
Kyriacou, 2001), and attrition (Gonzalez, Brown, & Slate, 2008). With the current trend towards inclusion of students with special needs in general classrooms (Avramidis, Bayliss, Burden, 2000), teachers have even greater need for sophisticated skills in managing student problem responses (Avramidis & Norwich, 2002; Heiman, 2001). Consequently, there is a need for effective behavior management strategies to assist teachers and students in the classroom (Emmer & Stough, 2001).

1.2 Reactive Classroom Approaches

Reactive classroom management involves the use of consequences following problem student responses that are intended to decrease the future probability of behavior (Clunies-Ross, Little, & Kienhuis, 2008). Teachers commonly use reactive approaches because they are easy to administer and temporarily suppress disruptive behavior (Maag, 2001), and because they lack training on use of more positive approaches (Buchanan, Guelder, Tran & Merrell, 2009; Meister & Melnick; Way, 2011).

Frequently used reactive approaches include reprimands (verbal statements indicating disapproval for inappropriate behavior; Sherrill, O’Leary, Albertson-Kelly, & Keneziora, 1996), response cost (confiscating something valuable from students; Kazdin, 1972), time-out (moving students to less rewarding environments contingent on the occurrence of problem behavior; Fabiano et al., 2004), and suspensions (temporarily removing students from the school environment; Evans & Lester, 2012). Although reactive approaches may provide immediate short term relief from student problem behavior, they are commonly associated with limitations and negative side effects over the long term (Ducharme, 2007; Lukowiak & Bridges, 2010).

First, temporarily reducing problem behavior through use of reactive strategies does not teach students appropriate responses or the skills needed to cope with future classroom demands (Maag, 2001; Witt, VanDerHeyden, & Gilbertson, 2004). In fact, the lack of skill development
makes it difficult for behavior change to generalize beyond classroom situations in which reactive approaches are used (Lerman & Vorndran, 2002). For instance, a student may stop responding aggressively in the presence of a teacher who uses reactive strategies but may demonstrate the problem response on the playground when the teacher is not present (Lukowiak & Bridges, 2010).

Second, the use of reactive approaches can sometimes serve to reinforce student problem responses, inadvertently increasing the likelihood of future problem behavior (Maag, 2001; Mayer, 2001). For instance, a teacher who sends a student to time-out for a negative response to an academic task may unintentionally provide the student with the desired outcome of escape from a difficult activity. Consequently, the student is more likely to act out in the future when faced with challenging work. Frequent use of reactive approaches by teachers can also lead to student feelings of resentment (Lewis, Romi, Katz, & Qui, 2008), alienation, and low self-worth (Lewis & McCann, 2009). Such feelings inhibit the development of student responsibility (Lewis, 2001) and can increase escape-driven problem behavior, further exacerbating academic difficulties (Lewis et al., 2008).

Finally, the frequent use of reactive approaches by teachers over the long-term can hinder the development of positive teacher-student relationships. Students who are often reprimanded can develop negative feelings and resentment towards teachers (Evans & Lester, 2012; Lukowiak & Bridges, 2010). As a result, they are more likely to react with problem behavior and less likely to exhibit prosocial behavior (Driscoll & Pianta, 2010). This can lead to teacher use of harsher discipline measures and further conflict between students and teachers (Driscoll & Pianta, 2010; Way, 2011). In contrast, students who perceive their teachers as warm and engaging are more likely to follow classroom rules and comply with teacher requests (Ducharme, 2007; Pianta, Steinberg, & Rollins, 1995; Way, 2011). Warm teacher-student interactions foster
supportive classroom environments (Hamre & Pianta, 2001) that promote social-emotional adjustment and academic achievement (Evans & Lester, 2012; Hughes, 2012).

1.3 Proactive Classroom Management

Over the last decade, there has been a movement towards more proactive forms of classroom management (Safran & Oswald, 2003) that allow teachers to reduce problem responses without many of the side effects associated with reactive approaches (Chitiyo, May, & Chitiyo, 2012). With proactive classroom management, teachers make use of procedures that prevent problem behaviors while concurrently teaching appropriate alternatives (Safran & Oswald, 2003). Although proactive strategies require additional preparation and planning from teachers (i.e., setting goals for students, arranging classroom layout and schedule), this approach supports students in a way that facilitates academic and social-emotional learning (Evertson & Poole, 2008).

1.4 Positive Behavior Support

Positive Behavior Support (PBS) is a proactive approach to treatment of problem behavior that has been extensively researched (Crone & Horner, 2003; Kincaid, Knoster, Harrower, Shannon, & Bustamante, 2002; Trussell, 2008). PBS procedures are largely derived from applied behavior analysis but also incorporate ecological systems theory (Carr et al., 2002; Hieneman, Dunlap & Kincaid, 2005). According to this theory, individuals live in communities that are interdependent; hence, change occurs in systems and not just in individuals (Bronfenbrenner, 1989; Carr et al., 2002). In line with this principle, PBS focuses on changing the context of the problem instead of the problem behavior (Carr et al., 2002). By intervening with the environment, individuals are more likely to experience success and personal satisfaction (Carr et al., 2002). The main goal of PBS is to help people change their lifestyle such that they have an improved quality of life (Carr et al., 2002).
The approach was originally developed for individuals with developmental disabilities but has been adapted for other populations including children with emotional and behavioral problems (Hieneman et al., 2005). In educational settings, PBS has evolved into a school-wide approach that comprises a range of strategies focused on prevention of student problem behavior and teaching of prosocial skills (Solomon, Klein, Hintze, Cresssey, & Peller, 2012). School-wide PBS (SWPBS) does not prescribe a specific curriculum or intervention approach in the classroom but requires the use of evidence-based practices to promote a positive school environment (Lewis et al., 2008; Solomon et al., 2012). It has been implemented in more than 7,900 schools across 30 different states in the U.S. (Allen, James, Evans, Hawkins, & Jenkins, 2005; Solomon et al., 2012).

SWPBS is implemented in three tiers to create an environment that supports learning outcomes and encourages student prosocial behavior (Cheney et al., 2009). The first tier involves establishment of universal classroom interventions (Sugai & Horner, 2008) and serves as a foundation for the other tiers (Trussell, 2008). This tier is focused on school-wide prevention of new cases of problem behavior (Sugai et al., 2000; Sugai & Horner, 2008). Prosocial behaviors are defined and strategies to teach them are developed (Lewis, Powers, Kelk, & Newcomer, 2002). Examples of first tier intervention include establishing school-wide expectations for behavior, teaching specific social skills to all students, and supervising hallways and common areas throughout the school (Solomon et al., 2012; Trussell, 2008). Although first tier interventions are implemented for the whole school, they target the 80-90% of students who do not exhibit severe behavior problems (Sugai & Horner, 2008).

In the second tier, smaller group interventions are implemented to reduce the number of students currently demonstrating problem behavior (Sugai & Horner, 2008). Examples of interventions in the second tier include social skills groups, self-management programs, and
adult mentoring (Trussell, 2008). These interventions provide general support for the approximately 5-10\% of students who are at greater risk of exhibiting problem behavior or who display mild to moderate conduct problems even with first tier intervention (Crone, Horner, & Hawken, 2004; Solomon et al., 2012).

The \textit{third tier} incorporates specialized intervention for students whose conduct problems were not addressed with first or second tier interventions (Sugai & Horner, 2008). The goal in this tier is to target the 1-5\% of students with severe problem behavior (Solomon et al., 2012; Sugai & Horner, 2008) and to reduce the intensity and complexity of their conduct problems (Sugai et al., 2000). Examples of third tier interventions include formal behavior intervention plans, specialized academic support, and parent training for specific students (Trussell, 2008). These interventions are highly intensive, individually designed, and typically based on data from Functional Behavioral Assessments (Sugai & Horner, 2008).

\textbf{1.5 Functional Behavioral Assessment (FBA)}

FBAs are conducted to determine environmental events that influence problem behavior (Bambara & Kern, 2005) and to inform selection of intervention strategies to target specific problem responses (Hieneman et al., 2005). One of the most important purposes of an FBA is to provide intervention agents with information to determine the function of specific problem behaviors (Gresham, Watson, Skinner, 2001).

The functions of behavior are the outcomes achieved by individuals when they exhibit a specific problem response (Hawkins & Axelrod, 2008; Lewis & Sugai, 1999). If these outcomes are positive or reinforcing for the individual, the problem behavior will continue to occur (Steege & Watson, 2008). Reinforcing outcomes for problem behavior can be categorized as either positive or negative reinforcement (McGill, Teer, Rye, & Hughes, 2005).
Positive reinforcement involves the occurrence of a pleasant event following a response that increases the probability of that behavior recurring in the future (Barnhill, 2005; Skinner, 1956). For instance, a child may tantrum because she wants candy on the shelf in the grocery store checkout aisle. If the embarrassed mother buys the candy to quell the tantrum, the child is more likely to demonstrate such behavior in the future to access the candy. Thus, the candy served as a positive reinforcer for the tantrum.

Negative reinforcement involves the removal of an unpleasant event that increases the probability of a behavior in the future (Barnhill, 2005). For example, if a student is sent to time out after throwing a book during reading time, the student is more likely to demonstrate disruptive behavior the next time he wants to avoid reading. In this case, time out served as a negative reinforcer that increased the probability of future problem responses in demand situations.

Once the function of the behavior and other contextually relevant information is determined, an intervention can be designed (Gresham et al., 2001). An intervention strategy that commonly follows from an FBA involves teaching a prosocial alternative behavior that serves the same function as the problem response (Lewis & Sugai, 1999; Tiger, Hanley, & Bruzek, 2008). Such a treatment approach is designed to render the problem behavior unnecessary by providing the individual with a more acceptable means of accessing desired circumstances (Durand & Carr, 1991). For example, a student can be taught to communicate “I need help” or “I need a break” as an alternative to becoming disruptive when an academic task is too difficult.

Interventions derived from FBAs have been effective at decreasing disruptive behavior (e.g., Sterling-Turner, Robinson, & Wilczynski, 2001), reducing self-injurious and aggressive behavior (e.g., Kern, Gallagher, Starosta, Hickman, & George, 2006; Kurtz et al., 2003), and
increasing on-task behavior (e.g., Hawkins & Axelrod, 2008). Although widely accepted by researchers and clinicians as an effective intervention tool, FBAs are not typically used by teachers due to concerns related to applicability and feasibility in the classroom (Gresham et al., 2004; Hawkins & Axelrod, 2008). These assessments can be complex to conduct, require expertise, and take considerable time to complete (March & Horner, 2002; Quinn et al., 2001). Without the assistance of psychologists and other classroom support staff, it can be difficult for teachers to conduct assessments with every student who has behavioral problems in their classroom (Ducharme & Shecter, 2011). Consequently, only a small portion of students who require additional supports are likely to receive them (Adelman & Taylor, 2002; Ducharme & Shecter, 2011).

1.6 Errorless Remediation

Errorless remediation is a proactive approach to intervention for conduct issues that does not typically require explicit knowledge of behavioral functions. The approach focuses on teaching individuals to tolerate and manage environmental conditions that lead to problem behavior (Ducharme, Di Padova, & Ashworth, 2010; Ducharme & Drain, 2004) and is derived from the errorless learning paradigm developed in the 1960’s. With errorless learning, students are taught to make correct discriminations by means of instructor supports that are gradually faded at a slow enough pace that the student makes few errors during learning (Terrace, 1963; Touchette, 1968). The approach derives from key learning principles including differential reinforcement and stimulus fading (Martin & Pear, 1978).

With errorless remediation, students are progressively introduced to challenging situations that commonly lead to problem behavior at a systematic pace that ensures that they are able to tolerate the demand and respond prosocially (Ducharme, 2000). A major advantage of the approach is the proactive nature of intervention. Given that errorless remediation leads to
greatly reduced levels of problem behavior during intervention, there is no need for punishment or other aversive strategies that are focused on terminating problem behavior. Thus, all of the negative side-effects associated with reactive approaches are circumvented.

Errorless remediation was first developed as a home-based intervention for problem behavior that is implemented by parents (Ducharme, 2008; Ducharme, 1996). This approach has been successfully applied to various populations including children with autism (e.g., Ducharme, Sanjuan, & Drain, 2007), intellectual disabilities (e.g., Ducharme & Popynick, 1993), and conduct difficulties (e.g., Ducharme et al., 2010; Folino, Ducharme, Conn, 2008).

1.7 Errorless Classroom Management (ECM)

More recently, errorless strategies have been adapted as a classroom approach known as Errorless Classroom Management (ECM; Ducharme, 2007). ECM is a proactive approach to classroom management that involves building student tolerance to classroom conditions associated with problem behavior (Ducharme, 2007). This is accomplished through the provision of supports by teachers that are gradually withdrawn as the student learns to cope with increasingly more challenging situations. The main components of ECM are (a) using moderating approaches to reduce problem behavior, (b) providing reinforcement for prosocial responding, and (c) fading of moderating approaches and reinforcement.

Moderating approaches. Students with internalizing and externalizing problems often act out because they do not have the skills to handle challenging classroom situations, such as completing academic work or interacting effectively with other students (Ducharme, 2007; Ducharme & Harris, 2005; Ducharme, Folino, & DeRossie, 2008). Moderating approaches are used by teachers to support students so they can learn to tolerate classroom demands and experience greater success in managing school-based difficulties (Ducharme, 2007). With such
support, students are less averse to classroom challenges and less likely to respond with problem behavior. Moderating approaches include antecedent and ecological approaches.

**Antecedent approaches.** Classroom behavior problems are typically associated with events that occur immediately before the behavior, for instance, a teacher request to complete academic work or the termination of a desirable activity (Ducharme, 2007). With antecedent approaches, the teacher temporarily modifies or withdraws these antecedent conditions as a means of ensuring student success in managing the situation. These support strategies include reducing academic demands, providing high probability requests, prompting, and priming students.

**Reducing demands.** One method of intervening for classroom conduct difficulties is to temporarily reduce the level of difficulty of task demands for students who find certain academic content aversive. Decreasing task difficulty reduces students’ need for problem responses focused on escaping the demand and can allow students to achieve expectations and improve their sense of self-efficacy (McMahon, Wernsman, & Rose, 2009). Once students begin to experience success, task demands can be gradually increased to meet curriculum requirements. Strategies for reducing demands include shortening periods of challenging work that is associated with problem behavior, interspersing academic tasks with periods of teacher assistance, or providing periodic breaks (Ducharme & Harris, 2005; Kern & Clemens, 2007).

**High probability requests.** To increase student cooperation and decrease oppositionality, teachers can issue high probability requests, those that are likely to yield compliant responses (Ducharme & Ng, 2012; Killu, Sainato, Davis, Ospelt, & Paul, 1998). When students are praised for complying with high probability requests, they begin to experience cooperative success and are more likely to comply with subsequent requests that are more challenging (Ducharme, 2007; Ducharme & DiAdamo, 2005).
**Prompting.** Prompts are visual, verbal, gestural, or physical cues that teachers can use to support students in dealing with academic and other challenges in the classroom (Faul, Stepensky, & Simonsen, 2012). For instance, a teacher could help a student begin an assignment by pointing to the question in the textbook and reading it aloud. Provision of such assistance can reduce the aversiveness of tasks that commonly lead to problem behavior (Faul et al., 2012; Flood, Wilder, Flood, & Masuda, 2002; Lancioni et al., 2001).

**Priming.** Priming involves statements that increase predictability for students and prepare or warn them about upcoming tasks, activities, or situations that have led to problem behavior in the past (Harrower, 1999; Kern & Clemens, 2007). Primes can reduce disruptive behavior related to upcoming transitions and other classroom changes that students find difficult to handle (Harrower & Dunlap, 2001).

**Ecological approaches.** Ecological approaches are designed to deal with physiological and psychological factors that can affect student behavior but are not directly observable in the classroom (Carter & Driscoll, 2007). Students who experience physiological stressors, such as fatigue, hunger, or illness (i.e., allergies) may be less tolerant of typical classroom expectations and react with disruptive behavior (Carter & Driscoll, 2007). For example, a student who is sleep-deprived may find an academic task more aversive than when well-rested and therefore may be more likely to oppose a teacher request to complete the task. Students can also suffer from emotional stressors including family violence, abuse, or divorce. Under these circumstances, they may demonstrate increased levels of problem behavior that provides a means of escaping or distracting themselves from negative thoughts and emotions related to these stressors (Hayes, Wilson, Gifford, & Follette, 1996).

Ecological variables can be difficult to determine, given that they do not occur in temporal proximity with the behavior that they influence and, as a result, pose a challenge for
intervention. Some physiological factors can be readily addressed (e.g., provision of breakfast programs for students without adequate nutrition, discussion with parents about sleep schedules for students who are sleep-deprived; Ducharme, 2007; Conroy & Fox, 1994). However, some psychological factors (i.e., family problems, violence) can be more difficult to address unless students are upfront about these problems or the issues are divulged by family members (Ducharme, 2007).

One strategy that can assist in managing ecological variables is the development of a warm and caring relationship between the student and the teacher that can serve as a foundation for student support and increase the likelihood that students will be open about discussing personal challenges (Ducharme, 2007; Hamre & Pianta, 2001). Teachers can build this relationship through one-to-one interactions with students, discussing areas of interests, and conveying acceptance and understanding (Driscoll & Pianta, 2010). Research demonstrates that a supportive relationship increases student compliance with classroom rules and teacher expectations (Gest, Welsh, & Domitrovich, 2005; Hughes, Luo, Kwok, & Lloyd, 2008). In the long term, positive teacher-student relationships are associated with stronger academic performance, higher motivation, and improved school adjustment (Hamre & Pianta, 2001; Hughes, 2012). When students are faced with challenging circumstances (e.g., a difficult home situation), a bond with a supportive teacher can promote resilience and coping (Anderson, Nelson, Richardson, Webb, & Young, 2011; Sabol & Pianta, 2012). Moreover, a warm teacher-student relationship can increase the rewarding nature of teacher contact with the student, ensuring that teacher praise is a potent source of reinforcement for prosocial classroom behavior.

Providing reinforcement. The second component of ECM is the provision of reinforcement for strengthening prosocial behavior, compliance, and on-task skills that occur spontaneously or as a result of teacher use of antecedent and ecological approaches (Ducharme,
Teacher praise contingent on appropriate student responding is associated with increases in on-task behavior (Mather & Goldstein, 2001), compliance (Fullerton, Conroy, & Correa, 2009), and prosocial behavior (Martens, Hiralall, & Bradley, 1997). Praise contingent on prosocial behavior is particularly relevant for students with conduct difficulties as they often receive more negative attention and reprimands for problem responses (Partin, Robertson, Maggin, Oliver, & Wehby, 2010; Stormont, Smith, & Lewis, 2007). When students receive frequent praise for prosocial responses, they no longer require problem behavior to gain access to teacher attention (Lampi, Fenty, Beaunae, 2005; Reinke, Lewis-Palmer, Martin, 2007; Stormont et al., 2007). For some students, especially those who do not find social interaction rewarding (e.g., students with autism), more concrete reinforcers may be required to increase appropriate classroom behavior. This might involve the use of tangible rewards (i.e., stickers, toys, computer time), reward systems, or token economies (Hoffmann, Huff, Patterson, & Nietfeld, 2009; Myles, Moran, Ormsbee, & Downing, 1992).

**Fading moderating approaches and reinforcement.** The final component of ECM involves the fading of teacher supports and positive reinforcement. Although moderating approaches can greatly improve a student’s ability to adapt to classroom situations, they often require intensive teacher involvement that can be difficult to maintain for extended periods (Ducharme, 2007). Moreover, students need to learn to perform effectively in the classroom without being dependent on constant supports from the teacher. Once students consistently demonstrate appropriate classroom behavior, supports (e.g., high probability requests, prompts, primes) and positive reinforcement can be incrementally faded as classroom demands are increased (Gardner, Bird, Maguire, Carreiro, & Abenaim, 2003; Luiselli, 1996). These strategies are carried out at a slow enough pace that students continue to behave prosocially as they develop independence. Ultimately, the goal is to return teacher support and curriculum
expectations to levels that are comparable to students without behavioral difficulties (Ducharme, 2007).

1.8 ECM with Keystone Skills

A keystone skill is one that when targeted for intervention can lead to widespread positive changes in areas that were not the focus of intervention (Barnett, Bauer, Ehrhardt, Lentz, & Stollar, 1996; Lalli, Kates, & Casey, 1999; Soutor, Houlihan, & Young, 1994). An emphasis on teaching specific keystone behaviors can result in concomitant reductions in problem responses (Ducharme & Shecter, 2011). A keystone approach is especially relevant to classroom management given that approximately 20% of students experience significant internalizing or externalizing problems (Costello et al., 2003) and have difficulties with noncompliance, disruption, aggression, and social skills (Algozzine et al., 2008; Harrison et al., 2012).

The most common explanation for the keystone effect involves the concept of response class (Ducharme & Shecter, 2011). A response class is defined as a group of behaviors that produce common consequences or provide access to similar classes of reinforcement (Lalli, Mace, Wohn, & Livezey, 1995); intervention with one behavior in a response class can result in covariant changes to others (Sprague & Horner, 1992). To illustrate, two behaviors that may serve in the same response class are communicative responses and disruptive behavior, because they can lead to similar outcomes (Durand & Carr, 1991; Horner & Day, 1991). For example, a student who is engaged in a challenging academic task can gain relief from the situation through disruptive responding (e.g., tearing up the assignment) or by means of a communicative response (e.g., asking the teacher for a break). As noted earlier, when teachers focus on teaching students to use prosocial communicative responses, problem behaviors can be rendered unnecessary and are likely to decrease (Carr & Kemp, 1989; Ducharme & Shecter, 2011).
Given the potential reduction of untargeted conduct problems when keystone skills are taught, this approach may be an effective strategy for classroom behavioral intervention. A major advantage of teaching keystone skills is that they can be used without need for knowledge of functions of specific problem responses, making the classroom management process more efficient and allowing teachers to bypass the previously mentioned challenges associated with FBAs. Within the framework of School-Wide Positive Behavior Support, once first tier universal supports are established, ECM could be implemented for the 5-10% of students in the classroom who have difficulty with specific keystone skills (i.e., compliance, on-task, and social skills described below). This approach could be a method of intervening prior to the application of more intensive procedures.

Based on a review of the behavioral intervention literature, Ducharme and Shecter (2011) proposed potential keystone skills for classroom management, such as compliance (Ducharme & Ng, 2012; Ducharme & Popynick, 1993; Soutor et al., 1994), on-task behavior (Beare, Severson, & Brandt, 2004; Todd, Horner, & Sugai, 1999), and social skills (Ducharme et al., 2008; Pfiffner & McBurnett, 1997). Thus, teacher focus on building these skills may promote the broadest possible positive outcomes for students.

**Compliance.** Compliance is defined as the initiation and completion of a desired task or response following requests delivered by a parent or teacher (Belfiore, Basile, & Lee, 2008; Chambers, 2006). As previously mentioned, noncompliance is one of the most common problems associated with student externalizing and internalizing problems. Managing noncompliant behaviors can be challenging for teachers and may take significant time away from their curriculum teaching efforts (Belfiore et al., 2008). Moreover, noncompliance may compromise student involvement and achievement in academic and social activities (Ford, Olmi, Edwards, & Tingstrom, 2001).
Over the past few decades, various intervention approaches have been developed to increase compliance (Mace et al., 1988; McMahon & Forehand, 2003; Olmi, Sevier, & Nastasi, 1997). Given its keystone nature, targeting student compliance can lead to improvements in a broad range of other classroom behaviors (Barnett et al., 1996), including reductions in aggressive, disruptive, and avoidant behaviors (Ellison, 1997; Mace et al., 1988) and increases in student engagement (Matheson & Shriver, 2005; Soutor, et al., 1994) and work productivity (Ellison, 1997).

**On-task behavior.** On-task responding, that is, remaining actively engaged in an academic activity, is an important skill that facilitates the acquisition of new information and predicts academic achievement (Alexander, Entwisle, & Dauber, 1993; Barriga et al., 2002). Students who consistently demonstrate on-task behavior are more likely to achieve higher marks and better scores on standardized tests (Alexander et al., 1993; Finn, Pannozzo, & Voelkl, 1995). Off-task behavior, that is, the failure of a student to actively participate in classroom activities, is often cited by teachers as a commonly occurring classroom management difficulty (Harrison et al., 2012). When a teacher is required to address off-task problems for one student, the learning of other students is often disrupted (Finn & Pannozzo, 2004). Targeting off-task behavior for improvement by teachers is often associated with positive changes in other behaviors (Lalli et al., 1999). Improvements in student engagement have been shown to covary with decreases in student aggression (i.e., kicking desks, throwing objects) and disruption (i.e., calling out, getting out of seat; Lee, Sugai, & Horner, 1999), and increases in compliance with teacher requests (Witt, Hannafin, & Martens, 1983).

**Social skills and acquiescence.** Many students with externalizing and internalizing problems struggle with peer relationships and would benefit from social skills training (Algozzine et al., 2008; Guevremont & Dumas, 1994; Korinek & Popp, 1997). However,
teaching social skills is a complex task that involves instruction in communication, problem-solving, decision-making, assertion, and group interaction (Kolb & Hanley-Maxwell, 2003). The average social skills intervention takes approximately 30 hours over a 12-week period (Mathur, Kavale, Quinn, Forness, & Rutherford, 1998; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999). Even with such intense intervention, effect sizes tend to be weak or moderate with long-standing social skills deficits continuing to persist (Ang & Hughes, 2001; Gresham, Van, & Cook, 2006).

Several studies have investigated the effects of social skills as a keystone behavior (Koegel, Koegel, Hurley, & Frea, 1992; Lee & Odom, 1996; Lee, Odom, Loftin, 2007; Loftin, Odom, & Lantz, 2008). Researchers found that improvements in social skills covaried with reductions in disruptive and stereotypic behavior for students with autism (Koegel et al., 1992; Lee & Odom, 1996) and that these changes could be maintained post intervention (Lee et al., 2007). However, given the wide range of social skill behaviors that require training and the duration of intervention necessary to produce improvements, there is need for more efficient strategies for enhancing peer relations (Ducharme & Shecter, 2011).

Within social skills instruction, a more circumscribed keystone skill that could potentially increase treatment efficacy is acquiescence (Ducharme et al., 2008). Through analysis of social skills checklists and observations of students in a day treatment program, Ducharme et al. (2008) determined that many social skills require children to give in to the will of others when it is appropriate to do so, such as for sharing and taking turns; they labelled this skill acquiescence or “flexing”. In the Ducharme et al. (2008) study, the authors specifically focused on training acquiescence and found that gains in this behavior were associated with increases in other prosocial behaviors and substantial decreases in antisocial behavior.

1.9 The Present Study
The purpose of the current study was to investigate the effectiveness of ECM in general and special education classrooms. Three teaching staff (2 from general classrooms and 1 from a special education classroom) were trained to use ECM with 9 students who had significant difficulty remaining on-task with academic activities and severe problems with peer social interactions. School staff were especially concerned with students’ social skills and on-task abilities and felt that compliance issues were less relevant to their population; hence, although ECM emphasizes all three of these keystone behaviors, teacher training focused on improving only on-task and social skills. Further, we were able to monitor compliance, as well as problem behavior, for the possibility of covariant change through intervention with the other two keystone skills.

The main objective of the study was to examine whether ECM would increase student on-task behavior, acquiescence with peers, and compliance with teacher requests, and decrease student disruptive/aggressive behavior. More specifically, the purpose of the study was to determine the degree to which increasing teacher use of reinforcement and antecedent strategies while decreasing use of reactive strategies would improve student academic on-task and acquiescent skills. In addition, the study was conducted to determine the degree to which ECM implementation would lead to covariant improvements in student compliance and disruptive behavior. The specific research questions are as follows:

1. Can intervention with Errorless Classroom Management result in targeted improvements in student academic on-task skills?
2. Can intervention with Errorless Classroom Management result in targeted improvements in student acquiescence?
3. Can intervention with Errorless Classroom Management result in covariant improvements in student compliance to teacher classroom requests?
4. Can intervention with Errorless Classroom Management result in covariant decreases in student disruptive/aggressive behavior?
Chapter 2: Method

2.1 Setting

The study was conducted at a large, urban, elementary school (JK to Grade 6) with approximately 670 students and 40 teaching staff (including educational assistants, music, and physical education teachers). Approximately 460 students were from Caucasian families. Approximately 180 students were from families who did not speak English as their primary language. About 25 students were from families who had recently immigrated to Canada (within the last 5 years). The school had a strong French Immersion program and offered two special education classes, primary and junior, for students with specific behavioral and learning needs.

2.2 Participants

Participant recruitment. Once ethical approval was granted by the University of Toronto and the school board research ethics committee, the researcher met with the teachers to provide information regarding the project, including a description of the classroom management approach, observational methods, and participant responsibilities. Teachers were then provided with information letters and consent forms, and given an opportunity to ask questions prior to indicating whether they would participate.

Based on what was approved by the school board research ethics committee, participant teachers were asked to select several students from their class who had behavioral challenges and whose parents had been previously contacted regarding these difficulties. These students had either received a psychological assessment or were on the waitlist for a psychological assessment due to behavioral concerns. Additional data regarding student grades and administration of standardized tests were not available as the school board research ethics committee did not provide approval for such procedures.
The teachers provided parents with a brief description of the project and sent home information letters and consent forms. Parents were asked to contact the researcher directly for additional study information or to address any concerns that they might have before participating. Parents who wished to participate were then asked to return the signed consent forms to the researcher. Once parents returned the consent forms, the primary researcher met with the students individually to provide a description of the study, answer questions, and obtain assent. Information letters describing the project were also sent home to parents of non-participating students (i.e., students who were not participating in the study but their teachers were participants).

**Teachers.** Three teachers (Anna\textsubscript{T1}, John\textsubscript{T2}, and Sarah\textsubscript{T3}) participated in the study and were the primary intervention agents. Anna\textsubscript{T1} (female) taught a split Grade 4/5 general class and had 9 years of prior teaching experience in general classrooms. John\textsubscript{T2} (male) taught a Junior Home-School Program (HSP) class for students in Grades 4 through 6. HSP consisted of 10 students who withdrew from their regular classrooms for language and mathematics and were given additional support due to their learning needs. Some of these students had received assessments for emotional/behavioral problems while others were still on a waiting list for such assessments. John\textsubscript{T2} had been teaching for 6 years, 5 of which were in special education. Sarah\textsubscript{T3} (female) taught a Grade 3 class. She had been teaching for 7 years in total with 2 years of experience in special education.

**Students.** Nine students (6 boys; 3 girls) participated in the study. The grade/program, age, and gender of the student participants are listed in Table 1. All 9 students demonstrated extremely high levels of off-task behavior and were verbally aggressive with peers. Parents of both Mike\textsubscript{S1} and Tyler\textsubscript{S8} refused to provide specific diagnostic information. Mike\textsubscript{S1} exhibited off-task behavior, had difficulty socializing with peers, and experienced intense anxiety. Tyler\textsubscript{S8}
was easily distracted, and struggled with remaining on-task. David was diagnosed with ADHD and ODD. Sasha and Anthony were diagnosed with Learning Disabilities. Tony and Sophie were diagnosed with ADHD. Gabriel was diagnosed with both ADHD and Learning Disabilities. All of the diagnoses were made by either a psychologist or psychiatrist. At the time of the study, Nicole had not been formally diagnosed but was on a waitlist for a psychological assessment.
Table 1

*Participant Students’ Grade/Program, Gender, and Age*

<table>
<thead>
<tr>
<th>Grade/Program</th>
<th>Classroom</th>
<th>Teacher</th>
<th>Student</th>
<th>Student Gender</th>
<th>Student Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 4/5</td>
<td>Classroom 1</td>
<td>Anna\textsubscript{T1}</td>
<td>Mike\textsubscript{S1}</td>
<td>M</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>David\textsubscript{S2}</td>
<td>M</td>
<td>11</td>
</tr>
<tr>
<td>Junior Home-School Program</td>
<td>Classroom 2</td>
<td>John\textsubscript{T2}</td>
<td>Sasha\textsubscript{S3}</td>
<td>F</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anthony\textsubscript{S4}</td>
<td>M</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tony\textsubscript{S5}</td>
<td>M</td>
<td>10</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Classroom 3</td>
<td>Sarah\textsubscript{T3}</td>
<td>Gabriel\textsubscript{S6}</td>
<td>M</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nicole\textsubscript{S7}</td>
<td>F</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tyler\textsubscript{S8}</td>
<td>M</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sophie\textsubscript{S9}</td>
<td>F</td>
<td>8</td>
</tr>
</tbody>
</table>

2.3 Research Design

We used a multiple-baseline across classrooms design (Kazdin, 1982a), incorporating time-series observational measures to evaluate intervention effects. Throughout baseline and treatment, students and teachers were observed for 1 hour each day. Teacher observations allowed us to examine teacher use of reinforcement, antecedent, and reactive procedures in the classroom. Student observations provided data on their acquiescence, compliance, and on-task behavior.

Baseline observations began simultaneously for all three classrooms. In accordance with multiple baseline designs, intervention was initiated in a time-lagged manner. Intervention was initiated first for Classroom 1. Classroom 2 started intervention one week after Classroom 1.
Classroom 3 began intervention 5.5 weeks after Classroom 2. The longer delay in intervention initiation for Classroom 3 was necessitated by the occurrence of Winter Holidays that precluded earlier training.

2.4 Research Assistants and Observer Training

Observational data were collected by the primary researcher and six research assistants (all female). At the time of the study, four research assistants were completing their undergraduate degrees in psychology, one research assistant was completing her Masters degree in teaching, and one research assistant had completed her PhD degree in psychology from another country. The four undergraduate level research assistants were responsible for coding student behaviors while the Masters level research assistant was responsible for coding teacher behaviors. The research assistant who had completed her doctorate degree was responsible for coding student and teacher behaviors since she had greater involvement in the study (i.e., spent more days coding than other research assistants).

Research assistants were trained by the primary researcher to collect data on student compliance, on-task, and acquiescence skills and teacher use of proactive behavior management strategies. During the first portion of training, research assistants reviewed a coding manual that included descriptions of coding procedures and sample data sheets. At a training workshop, research assistants practiced coding using videos of teacher and student behavior and received immediate corrective feedback. During initial classroom observations, research assistants shadowed the primary researcher and coded alongside her. Once each research assistant demonstrated at least 80% reliability, she coded independently. When study observations were initiated, the research assistants were kept blind to study conditions.

2.5 Observational Teacher Measures
A coding system was developed to assess the frequency of teachers’ use of reinforcement, antecedent, and reactive approaches (Appendix A). Table 2 summarizes the operational definitions and methods of measurement for teacher behavior.

Table 2

*Operational Definitions and Measurement for Teacher Behavior*

<table>
<thead>
<tr>
<th>Observational Teacher Measure</th>
<th>Operational Definition</th>
<th>System of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforcement behavior</td>
<td>Positive teacher behavior directed towards students in response to desirable student behavior</td>
<td>Frequency</td>
</tr>
<tr>
<td>Antecedent behavior</td>
<td>Supportive teacher behavior directed towards increasing student prosocial behavior</td>
<td>Frequency</td>
</tr>
<tr>
<td>Reactive behavior</td>
<td>Teacher behavior used in an attempt to immediately terminate student problem behavior</td>
<td>Frequency</td>
</tr>
</tbody>
</table>

**Reinforcement.** Reinforcement was defined as any positive teacher behavior that was directed towards students in response to desirable student behavior. Categories for reinforcement consisted of praise and reward. Praise included non-tangible verbal or non-verbal recognition of desirable student behavior (e.g., teacher saying “Fantastic job!”, “Nice flexing with John!”, high-fiving a student). Rewards consisted of tangible verbal or non-verbal recognition of prosocial student behavior that included offers of tangible rewards or privileges (e.g., telling students that they would receive 5 extra minutes of play for prosocial behavior,
providing students with tokens for working quietly, offering students computer time for appropriate behavior).

To measure interobserver agreement, portions of baseline, intervention, and follow-up sessions were simultaneously observed by a second observer (another research assistant or the primary researcher). To enhance agreement, observers regularly discussed why discrepancies occurred after a coding session. Interobserver agreement was collected on 13% of baseline reinforcement behavior, 11% of treatment reinforcement behavior, and 54% of follow-up reinforcement behavior. Cohen’s Kappa was calculated to provide a measure of interobserver agreement while controlling for chance agreement. The guidelines typically used for interpreting Kappa values are from Landis and Koch (1977) where 0-0.20 is slight agreement, 0.21-0.40 is fair agreement, 0.41-0.60 is moderate agreement, 0.61-0.80 is substantial agreement, and 0.81-1 is almost perfect agreement (Munoz & Bangdiwala, 1997). Kappa values ranged from substantial to almost perfect agreement at 0.79 during baseline (range = 0.76 to 0.82), 0.82 during treatment (range = 0.79 to 0.85) and 0.80 during follow-up (range = 0.78 to 0.82).

Antecedent approaches. Antecedent approaches comprised supportive teacher behavior directed at increasing student prosocial behavior. Antecedent approaches included 4 teacher behaviors: prompting, building rapport, priming for transitions, and providing choices. Prompting was defined as teachers’ use of verbal, gestural, modeling, or physical prompts to assist students in performing a desired behavior. However, an explicit request or demand (e.g., “get your book”) was not considered a prompt. Examples of prompting include scaffolding a student’s response by making comments such as “a noun is a person, place or, th…”, pointing to a worksheet to encourage a student to begin writing, or explaining “we get ready for recess by tidying up” while modeling tucking in a chair. Building rapport was coded when teachers engaged a student in conversations about a topic of interest or about the student’s life (i.e.,
weekend activities, upcoming holidays). Priming for transitions was coded when teachers provided students with verbal or nonverbal signals of an impending transition. This category included, for instance, telling students “you have 5 minutes left to finish the worksheet”, using a timer, or reviewing the students’ schedule for the day. Providing choice was coded when teachers provided students with a preference between activities, reinforcement, or classroom materials to keep students engaged. Examples of choice provision included asking a student “Do you want the green or yellow marker?”, offering a choice between typing on a computer or writing on paper, or providing opportunities for students to choose between computer time, board games, or play time as a reward.

To measure interobserver agreement, portions of baseline, intervention, and follow-up sessions were simultaneously observed by a second observer (another research assistant or the primary researcher). Interobserver agreement was collected on 12% of baseline antecedent behavior, 12% of treatment antecedent behavior, and 47% of follow-up antecedent behavior. Kappa agreement was substantial at 0.73 during baseline (range = 0.69 to 0.77), 0.78 during treatment (range = 0.74 to 0.82), and 0.78 during follow-up (range = 0.76 to 0.80).

**Reactive approaches.** Reactive approaches were defined as responses that teachers used in an attempt to immediately terminate a student problem behavior. This category consisted of 6 teacher behaviors: reprimands, negative nonverbal attention, time-out, withdrawal of privileges, threats, and physical restraints. A reprimand consisted of a negative or disapproving statement directed at the student following a problem response. Examples include “stop chatting with your friend” and “stop running in the halls.” Negative nonverbal attention was coded when teachers reacted negatively but without words following problematic student behavior. Examples include frowning, glaring, or pointing a finger at the student. Time-out was recorded when teachers sent students to a separate area in or out of the classroom in response to problem behavior. Examples
include sending a student to a corner of the class to work or to the principal’s office following a problem behavior. Withdrawal of privileges was defined as the removal of tangible rewards or privileges in response to undesirable student behavior. For example, this was coded when teachers kept students in for recess, reduced computer time for off-task behavior, or removed tokens for disruptive behavior. Threats consisted of statements to students describing negative consequences for future problem responses. Examples include warnings that recess will be cancelled or that parents will be called for problem behavior. Physical restraint referred to any physical hold by teaching staff that restricted student voluntary movement. Examples include holding a student’s hand or physically escorting a student from one area to another.

To measure interobserver agreement, portions of baseline, intervention, and follow-up sessions were simultaneously observed by a second observer (another research assistant or the primary researcher). Interobserver agreement was collected on 10% of baseline reactive behavior, 11% of treatment reactive behavior, and 42% of follow-up reactive behavior. Kappa agreement was substantial at 0.73 during baseline (range = 0.67 to 0.79), 0.74 during treatment (range = 0.71 to 0.76), and 0.73 during follow-up (range = 0.71 to 0.74).

2.6 Staff Report Measures

**Teacher Demographics Questionnaire.** Teachers were asked to complete the Teacher Demographics Questionnaire prior to the initiation of baseline (Appendix B). This questionnaire consisted of 8-items related to their teaching history (e.g., number of years teaching, grades taught, additional training).

**Staff Consumer Satisfaction Questionnaire.** Teachers completed the Staff Consumer Satisfaction Questionnaire used in a previous study (Ducharme & Ng, 2012) to measure their satisfaction with intervention efforts (Appendix C). The questionnaire consisted of 6 items rated on a 5-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree* and 2 open-
ended questions. Teachers filled out the questionnaire following completion of the intervention phase.

2.7 Observational Student Measures

During the 1 hour daily observation for students, the first 30 minutes were typically used to observe on-task behavior. During the second 30 minutes, research assistants observed acquiescent and compliant behavior. On several occasions during which classroom group activities took place at the start of the observation session (when students interacted more frequently with peers), students were observed for acquiescent and compliant behavior during the first 30 minutes and on-task behavior during the second 30 minutes of observation. Table 3 summarizes the operational definitions and methods of measurement for student behavior.
Table 3

*Operational Definitions and Measurement for Student Behavior*

<table>
<thead>
<tr>
<th>Observational Student Measure</th>
<th>Operational Definition</th>
<th>System of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-task behavior</td>
<td>Student followed task instructions for at least 50 percent of the interval (5 seconds).</td>
<td>Partial-interval recording (percentage of intervals)</td>
</tr>
<tr>
<td>Acquiescent behavior</td>
<td>Student appropriately gave in to or “flexed” to a peer request</td>
<td>Frequency (percentage of acquiescent behavior)</td>
</tr>
<tr>
<td>Compliant behavior</td>
<td>Student appropriately responded to teacher request within 10 seconds and completed request within 60 seconds</td>
<td>Frequency (percentage of compliant behavior)</td>
</tr>
</tbody>
</table>

**On-task.** Research assistants collected observational data on student academic on-task behavior during baseline, intervention, and follow-up. Students were observed in the same subject (either mathematics or language given that they are core subjects taken on a regular basis) each day for 5 minute sessions using a 10-minute partial interval recording procedure (Appendix D). Student behavior was recorded as on-task, off-task, neutral, or aggressive/disruptive. Students were considered on-task if they appropriately followed task instructions (i.e., writing or reading) for at least 50 percent of the interval (5 seconds). Student behavior was coded as either off-task or neutral if no observable on-task behavior occurred for more than 50 percent of the interval. Students were considered off-task if they were not actively engaged in task instructions (i.e., speaking with a peer, fidgeting with a toy), and as neutral if their behavior was ambiguous (i.e., looking at a worksheet without any output, waiting for
teacher attention, erasing). If students were observed to be verbally/physically aggressive or disruptive at any time during the interval, they were recorded as disruptive/aggressive for that interval (i.e., verbal aggression, intruding on someone else’s personal space, throwing objects, hitting). The percentage of intervals coded as on-task, off-task, neutral, and disruptive/aggressive was calculated for each session.

To determine interobserver agreement, a portion of on-task behavior was simultaneously coded by a second observer (another research assistant or the primary researcher) during baseline, intervention, and follow-up. Interobserver agreement was collected on 15% of baseline on-task sessions, 18% of treatment sessions, and 48% of follow-up sessions. Kappa agreement was substantial at 0.72 during baseline (range = 0.61 to 0.81), 0.78 during treatment (range = 0.69 to 0.81) and 0.80 during follow-up (range = 0.77 to 0.83).

**Acquiescence.** Acquiescence was defined as the target student appropriately giving in to or “flexing” to a peer request. Acquiescent events were initiated by a peer of the target student and took the form of a verbal request, nonverbal request, or provocation. A verbal request occurred when a peer appropriately asked the target student to do or provide something (e.g., “Can I borrow your eraser?” or “Give me that eraser.” that belonged to the target student but was not currently being used by the student). A nonverbal request occurred when a peer appropriately but implicitly asked the target student to do or provide something (e.g., a peer holding out his hand to indicate that he would like to have a chip from the student’s bag of chips.) A provocation occurred when a peer aggravated the target student in some way (e.g., butting in line, calling the student an inappropriate name, or grabbing something from the student without asking). Students were considered acquiescent if they began cooperating with a peer request within 10 seconds and completed it within approximately 60 seconds (Appendix E). Students were also considered acquiescent when they remained calm (e.g., “kept their cool”).
following a peer provocation. The percentage of acquiescent behavior for each session was calculated based on the number of student acquiescent behaviors divided by the total number of acquiescent events and multiplied by 100.

To measure interobserver agreement in acquiescence, portions of baseline, intervention, and follow-up were simultaneously observed by a second observer (another research assistant or the primary researcher). Interobserver agreement was collected on 12% of acquiescent events in baseline, 10% in treatment, and 29% in follow-up. Kappa agreement was substantial to almost perfect at 0.81 during baseline (range = 0.74 to 0.83), 0.82 during treatment (range = 0.77 to 0.85), and 0.80 during follow-up (range = 0.77 to 0.83).

**Compliance.** Students were considered compliant if they initiated an appropriate response to the request of one of the classroom staff within 10 seconds and completed the request within approximately 60 seconds (Appendix E). Students were considered noncompliant in the following three circumstances: (1) the student took longer than 10 seconds to begin the appropriate response, (2) the student began the appropriate response but did not complete the task within a reasonable period of time, or (3) classroom staff were required to repeat the request.

To measure interobserver agreement in compliance, portions of baseline, intervention, and follow-up were simultaneously observed by a second observer (another research assistant or the primary researcher). Interobserver agreement was collected on 12% of baseline requests, 11% of treatment requests, and 28% of follow-up requests. Kappa agreement was substantial at 0.76 during baseline (range = 0.74 to 0.78), 0.79 during treatment (range = 0.70 to 0.84) and 0.80 during follow-up (range = 0.75 to 0.84).

2.8 Procedures

**Baseline.** Baseline observations began simultaneously for all classrooms. During this phase, teachers were instructed to interact with students in their typical manner. Baseline
durations were 1.5 weeks for Classroom 1, 2.5 weeks for Classroom 2, and 2 months for Classroom 3.

**Intervention.** At the start of the intervention phase, teachers attended an individual 1-hour training workshop at the school conducted by the primary researcher. Teachers were provided with handouts and a PowerPoint presentation on the principal components of ECM. Training involved didactic instruction, modeling, and performance feedback. The researcher began the workshop by providing an explanation of reactive classroom management and discussing the problems associated with this approach (e.g., may inadvertently reinforce disruptive behavior, may impair student-teacher rapport, does not teach students how to deal with difficult circumstances that typically lead to problem behavior). Next, the researcher described the principal components of ECM (i.e., using moderating approaches, reinforcing prosocial responses, and fading moderating approaches and reinforcement) and explained the advantages of using this model (i.e., students experience success, creates positive classroom environment, students learn skills necessary to manage challenging classroom conditions).

Teachers were then introduced to the concept of keystones, which are skills that when taught, result in a broad range of behavioral improvements (Barnett et al., 1996). The researcher discussed the purpose of teaching keystones and how they could lead to improvements in student behavior that were not targeted in intervention. Afterwards, teachers were given definitions of on-task and acquiescence skills, keystones that would be targeted based on the needs of their students (see Appendix G). Finally, specific strategies to teach both skills were discussed (comprising the principle components of ECM).

To increase on-task abilities, teachers were taught to use moderating strategies, such as building rapport with students prior to engagement in academic activities and prompting them to begin. They were also instructed to reinforce on-task behavior, such as by praising students for
working independently (e.g., “Great job doing that on your own!”), and returning to them intermittently to acknowledge their on-task efforts. To increase student acquiescence, teachers were given 6 lesson plans to teach specific skills with a foundation in the concept of acquiescence (e.g., helping one another, listening and going along with someone else’s ideas, keeping your cool when things don’t go your way, inviting others to join in, thanking others, and sticking up for yourself). The researcher discussed ways in which the teacher could incorporate each of these lesson plans (approximately 10 minutes in duration) prior to classroom group activities. Teachers were trained on how to: (1) introduce the concept of “flexing” (giving into the will of other students when it is appropriate to do so) and discuss the specific skill with students; (2) incorporate student role-plays of appropriate and inappropriate use of flexing; and (3) help students reflect on the correct and incorrect use of the skill through discussion. The researcher also modeled how teachers could demonstrate, prompt, and reinforce specific occasions of flexing, such as sharing something currently in their possession (e.g., “Do you think you could let Michael have a turn with that toy?” and “That was really nice flexing!”). At the end of the workshop, teachers were given opportunities to ask questions regarding ECM.

**Post-workshop-intervention Feedback.** After the intervention workshop, the primary researcher provided verbal performance feedback to teachers following classroom activities on a weekly basis. The primary researcher also observed each teacher in at least one implementation of an acquiescent lesson plan. During feedback, the researcher discussed how well the teacher facilitated the lesson and answered questions relating to problems the teacher may have experienced.

Feedback was gradually faded throughout the post-training period; no feedback was provided in follow-up. During these feedback sessions, the researcher acknowledged strategies that the teacher used appropriately and suggested areas of improvement (e.g., situations where
the teacher could have praised students or provided prompts). Teachers were also given
opportunities to ask questions and discuss difficulties associated with student behavior and
implementation of ECM procedures.

**Follow-up.** Follow-up observations were conducted weekly for Classrooms 1 and 2 and
biweekly for Classroom 3 (Sarah requested that classroom disruptions related to this project be
minimized during follow-up).

### 2.9 Data Analysis

Given that this study incorporated time-series measurement, we used visual analysis as
the primary method of data analysis (Gliner, Morgan, & Harmon, 2000). This approach involves
graphing behavioral data in sequence and examining trends to determine whether changes in
behavior occurred following intervention (Scruggs & Mastropieri, 1998). In the current study,
we analyzed time-series data to assess changes in teacher and student levels of behavior (i.e.,
data trends and mean scores in frequency for categorical variables or percentage for interval
variables) across baseline, intervention, and follow-up phases. We also examined the magnitude
of the effect (i.e., changes in mean scores) and compared the consistency of data patterns across
different classrooms (Cakiroglu, 2012; Horner et al., 2005).

Although the most common method used to analyze time-series data is visual analysis
(Horner et al., 2005), researchers have more recently begun using statistical analysis as a
supplement to report intervention efficacy and to provide a means of comparing results across
studies (Parker, Hagan-Burke, & Vannest, 2007). The two most common analyses to determine
effect size in time-series data are percentage of non-overlapping data (PND) and percentage of
all non-overlapping data (PAND) (Waddell, Nassar, & Gustafson, 2011). However, there are
several limitations associated with PND. One concern is that PND has unknown reliability as it
does not have a known sampling distribution so $p$ values cannot be calculated (Parker et al.,
Second, PND calculations rely on one baseline data point; hence, having a high data point can skew the results (Strain, Kohler, & Gresham, 1998). Lastly, PND does not consider data trends which are a key method of analysis in time-series designs (Strain et al., 1998). Given the limitations with using PND, researchers have advocated for PAND as an alternative (Parker et al., 2007; Strain, Kohler, & Gresham, 1998; Waddell et al., 2011). PAND uses all data from baseline and intervention phases and does not emphasize the importance of one data point (Parker et al., 2007). In addition, PAND can be translated into Pearson’s Phi to calculate effect size (Strain et al., 1998).

In the current study, PAND was determined based on the method proposed by Parker et al. (2007; see Appendix F). First, the lowest treatment data point was identified. Next, the number of baseline data points that fell above the lowest point was tallied. The percentage of overlap was determined by dividing the number of overlapping data points by the total number of data points during baseline and treatment. Finally, the percentage of overlapping data points was subtracted from 100. PAND was then converted to Pearson’s Phi to determine effect size (see Appendix F for procedure used to calculate effect size; Parker et al., 2007).
Chapter 3: Results

3.1 Teacher Measures

To assess changes in teacher behavior with the implementation of ECM strategies, teachers were observed for their use of reinforcement, antecedent, and reactive approaches in the classroom. The data represent teacher interactions with all of the students in the classrooms, including students who participated and those who did not.

**Reinforcement.** The sessional use of reinforcement during baseline, treatment, and follow-up for all three teachers is depicted in Figure 1. The frequency of reinforcement behavior for each session was based on 1-hour periods. The mean level of reinforcement behavior across sessions for each phase is illustrated by the dotted lines on the graph. PAND for reinforcement behavior was 82%. The effect size calculated based on PAND for reinforcement behavior was large ($\Phi = 0.61$). All three teachers’ use of reinforcement increased between baseline and treatment. These results were maintained during follow-up.

Visual analysis of teacher reinforcement behavior levels (see Appendix H) indicated variability across baseline and treatment phases. Trend analysis (see Appendix I) showed some variability during baseline but improvements in stability during treatment and follow-up phases across all 3 teachers.
Figure 1. Frequency of reinforcement behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean levels of reinforcement behavior during that phase.
Table 4 depicts the mean frequency of reinforcement behavior across sections for each teacher during baseline, treatment, and follow-up.

Table 4

*Mean Levels of Reinforcement Behavior*

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Mean frequency of reinforcement behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Anna$_{T1}$</td>
<td>11</td>
</tr>
<tr>
<td>John$_{T2}$</td>
<td>12</td>
</tr>
<tr>
<td>Sarah$_{T3}$</td>
<td>9</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase (+) in frequency between baseline/treatment and baseline/follow-up.

**Antecedent approaches.** Figure 2 shows the use of antecedent approaches in time series during baseline, treatment, and follow-up for all three teachers. The frequency of antecedent behavior for each session was based on 1-hour periods. PAND for use of antecedent approaches was 72%. The ES calculated based on PAND for antecedent behavior was moderate ($Phi = 0.42$). Although ES indicated a significant intervention effect for antecedent behavior, time series data suggest no meaningful improvements for this variable.

Visual analysis of antecedent behavior levels (see Appendix J) indicated variability across all 3 teachers. Trend analysis (see Appendix K) showed relative stability during baseline (except for Sarah$_{T3}$), treatment, and follow-up.
Figure 2. Frequency of antecedent behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean levels of antecedent behavior during that phase.
Table 5 shows the mean frequency of antecedent behavior across sessions for each teacher during baseline, treatment, and follow-up.

**Table 5**

*Mean Levels of Antecedent Behavior*

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Mean frequency of antecedent behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Anna&lt;sub&gt;T1&lt;/sub&gt;</td>
<td>19</td>
</tr>
<tr>
<td>John&lt;sub&gt;T2&lt;/sub&gt;</td>
<td>21</td>
</tr>
<tr>
<td>Sarah&lt;sub&gt;T3&lt;/sub&gt;</td>
<td>17</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase (+) or decrease (-) in frequency between baseline/treatment and baseline/follow-up.

**Reactive approaches.** All three teachers’ use of reactive approaches is illustrated in time series for baseline, treatment, and follow-up in Figure 3. The frequency of reactive behavior for each session was based on 1-hour periods. PAND for reactive approaches was 81%. ES calculated based on PAND for reactive behavior was large (*Phi* = 0.59). All three teachers’ use of reactive approaches decreased from baseline to treatment. These results were sustained during follow-up.

Table 6 illustrates the mean frequency of reactive behavior across sessions for each teacher during baseline, treatment, and follow-up. Visual analysis of reactive behavior levels (see Appendix L) indicated variability across all 3 phases of the study. Trend analysis (see Appendix M) showed variability during baseline but stability during treatment and follow-up phases.
Figure 3. Frequency of reactive behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean levels of reactive behavior during that phase.
Table 6

*Mean Levels of Reactive Behavior*

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Baseline</th>
<th>Treatment</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anna_{T1}</td>
<td>12</td>
<td>8 (-4)</td>
<td>4 (-8)</td>
</tr>
<tr>
<td>John_{T2}</td>
<td>15</td>
<td>8 (-7)</td>
<td>7 (-8)</td>
</tr>
<tr>
<td>Sarah_{T3}</td>
<td>19</td>
<td>7 (-12)</td>
<td>9 (-10)</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean decrease (-) in frequency between baseline/treatment and baseline/follow-up.

3.2 *Staff Consumer Satisfaction Questionnaire*

Results from the Staff Consumer Satisfaction Questionnaire showed that teachers were satisfied with the intervention. The mean satisfaction score was 4.3 (out of 5). When asked about areas of improvement, teachers suggested that classroom observations be less frequent. In particular, Sarah_{T3} found that daily observations interrupted her classroom routines. When asked what they liked most about the training program, teachers indicated that they found ECM to be a practical approach and particularly liked using role-plays to teach acquiescence.

3.3 *Student On-task Measures*

On-task behavior. Figure 4 depicts the sessional percentage of on-task behavior during baseline, treatment, and follow-up for all nine students. The mean percentage of on-task behavior during each phase is represented by the dotted lines on the graph. As can be seen in the figure, all nine students demonstrated improvements in on-task behavior from baseline to treatment. These gains were maintained during the follow-up phase.
PAND for on-task behavior across all 9 students was 74%. The effect size (ES) found using PAND for on-task behavior was moderate ($\Phi = 0.42$).

Table 7 shows the mean percentage of on-task behavior during baseline, treatment, and follow-up for all nine students. The overall mean increase in on-task behavior across the nine students from baseline to treatment was 43 percentage points.

Table 8 illustrates the mean percentage of on-task behavior by classroom during each phase of the study. As can be seen in the table, students from Classroom 1 (Grade 4/5) demonstrated the greatest increase in on-task behavior at 53 percentage points, followed by Classroom 2 (Home-School Program) at 46 percentage points, and Classroom 3 (Grade 3) at 34 percentage points.

Visual analysis of levels (see Appendix N) indicated variability in baseline and treatment phases. Level variability improved during follow-up phases for all of the students except for Tyler$\text{S8}$. Trend analysis (see Appendix O) showed slight acceleration during baseline phases but improvements in stability during treatment and follow-up phases.
Figure 4. Percentage of on-task behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean on-task levels during that phase.
Table 7

*Mean Levels of On-task Behavior by Student*

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of on-task behavior</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td>Treatment</td>
</tr>
<tr>
<td>Mike_{S1}</td>
<td>Not available</td>
<td>29%</td>
<td>74% (45)</td>
</tr>
<tr>
<td>David_{S2}</td>
<td>ADHD, ODD</td>
<td>15%</td>
<td>76% (61)</td>
</tr>
<tr>
<td>Sasha_{S3}</td>
<td>LD</td>
<td>37%</td>
<td>80% (43)</td>
</tr>
<tr>
<td>Anthony_{S4}</td>
<td>LD</td>
<td>35%</td>
<td>84% (50)</td>
</tr>
<tr>
<td>Tony_{S5}</td>
<td>ADHD</td>
<td>38%</td>
<td>84% (46)</td>
</tr>
<tr>
<td>Gabriel_{S6}</td>
<td>ADHD, LD</td>
<td>43%</td>
<td>85% (42)</td>
</tr>
<tr>
<td>Nicole_{S7}</td>
<td>Not available</td>
<td>33%</td>
<td>73% (39)</td>
</tr>
<tr>
<td>Tyler_{S8}</td>
<td>Not available</td>
<td>47%</td>
<td>86% (39)</td>
</tr>
<tr>
<td>Sophie_{S9}</td>
<td>ADHD</td>
<td>63%</td>
<td>81% (18)</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment. The dotted line groups students within the same classroom.
Table 8

*Mean Levels of On-task Behavior by Classroom*

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Student</th>
<th>Mean percentage of on-task behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Classroom 1 (Grade 4/5)</td>
<td>Mike_{S1}, David_{S2}</td>
<td>22%</td>
</tr>
<tr>
<td>Classroom 2 (Junior Home-School Program)</td>
<td>Sasha_{S3}, Anthony_{S4}, Tony_{S5}</td>
<td>37%</td>
</tr>
<tr>
<td>Classroom 3 (Grade 3)</td>
<td>Gabriel_{S6}, Nicole_{S7}, Tyler_{S8}, Sophie_{S9}</td>
<td>47%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment.

**Neutral behavior.** Table 9 illustrates the mean number of intervals coded as neutral during baseline, treatment, and follow-up for each student. The overall mean percentage of intervals coded as neutral were 21% during baseline, 8% during treatment, and 7% during follow-up.
Table 9

*Mean Levels of Neutral Behavior*

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of neutral behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Mike³₁</td>
<td>Not available</td>
<td>27%</td>
</tr>
<tr>
<td>David³₂</td>
<td>ADHD, ODD</td>
<td>29%</td>
</tr>
<tr>
<td>Sasha³₃</td>
<td>LD</td>
<td>23%</td>
</tr>
<tr>
<td>Anthony³₄</td>
<td>LD</td>
<td>25%</td>
</tr>
<tr>
<td>Tony³₅</td>
<td>ADHD</td>
<td>11%</td>
</tr>
<tr>
<td>Gabriel⁶</td>
<td>ADHD, LD</td>
<td>12%</td>
</tr>
<tr>
<td>Nicole⁷</td>
<td>Not available</td>
<td>23%</td>
</tr>
<tr>
<td>Tyler⁸</td>
<td>Not available</td>
<td>18%</td>
</tr>
<tr>
<td>Sophie⁹</td>
<td>ADHD</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Note.* The dotted line groups students within the same classroom.

**Off-task behavior.** The sessional percentage of off-task behavior for all nine students during baseline, treatment, and follow-up is represented in Figure 5. The mean percentage of off-task behavior for each phase is depicted by the dotted lines on the graph. As is evident from the figure, the percentage of off-task behavior decreased between baseline and treatment phases. These improvements were maintained during follow-up.

PAND for off-task behavior across all 9 students was 75%. The ES found using PAND for off-task behavior was moderate (*Phi* = 0.42).
Table 10 shows the mean levels of off-task behavior for each student during baseline, treatment, and follow-up. The overall mean decrease of off-task behavior across all nine students from baseline to treatment was 29 percentage points.

Table 11 depicts the mean levels of off-task behavior by classroom during each phase of the study. The greatest decrease in off-task behavior was observed in Classrooms 1 (Grade 4/5) and 2 (Home-School Program), with 36 and 35 percentage points respectively.
Figure 5. Percentage of off-task behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean off-task levels during that phase.
Table 10

*Mean Levels of Off-task Behavior by Student*

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of off-task behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>MikeS1</td>
<td>Not available</td>
<td>44%</td>
</tr>
<tr>
<td>DavidS2</td>
<td>ADHD, ODD</td>
<td>56%</td>
</tr>
<tr>
<td>SashaS3</td>
<td>LD</td>
<td>39%</td>
</tr>
<tr>
<td>AnthonyS4</td>
<td>LD</td>
<td>41%</td>
</tr>
<tr>
<td>TonyS5</td>
<td>ADHD</td>
<td>50%</td>
</tr>
<tr>
<td>GabrielS6</td>
<td>ADHD, LD</td>
<td>43%</td>
</tr>
<tr>
<td>NicoleS7</td>
<td>Not available</td>
<td>40%</td>
</tr>
<tr>
<td>TylerS8</td>
<td>Not available</td>
<td>35%</td>
</tr>
<tr>
<td>SophieS9</td>
<td>ADHD</td>
<td>17%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean decrease in percentage points between baseline and treatment. The dotted line groups students within the same classroom.
Table 11

*Mean Levels of Off-task Behavior by Classroom*

<table>
<thead>
<tr>
<th>Classroom 1 (Grade 4/5)</th>
<th>Student</th>
<th>Mean percentage of off-task behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mike(<em>{S1}), David(</em>{S2})</td>
<td>50% [14% (36)] 15%</td>
</tr>
<tr>
<td>Classroom 2 (Junior Home-School Program)</td>
<td>Sasha(<em>{S3}), Anthony(</em>{S4}), Tony(_{S5})</td>
<td>43% [8% (35)] 7%</td>
</tr>
<tr>
<td>Classroom 3 (Grade 3)</td>
<td>Gabriel(<em>{S6}), Nicole(</em>{S7}), Tyler(<em>{S8}), Sophie(</em>{S9})</td>
<td>34% [13% (21)] 11%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean decrease in percentage points between baseline and treatment.

**Disruptive/aggressive behavior.** Throughout baseline, treatment, and follow-up phases, the percentage of disruptive/aggressive behavior was extremely low for all 9 students. This floor effect for disruptive/aggressive behavior rendered these data less relevant than other target responses. As such, a time series graph was not included.

Table 12 illustrates the mean number of intervals coded as disruptive/aggressive during baseline, treatment, and follow-up for each student. The overall mean percentage of intervals coded as disruptive/aggressive were 1.2% during baseline, 0.9% during treatment, and 0.5% during follow-up. Several students (Anthony\(_{S4}\), Tony\(_{S5}\), and Sophie\(_{S9}\)) appeared to show a slight increase in disruptive/aggressive behavior from baseline to treatment. Review of the daily on-task observations for these students revealed that this increase was due to one or two outbursts of disruptive/aggressive behavior but that the majority of daily disruptive/aggressive behavior during treatment was 0%.
Table 12

*Mean Levels of Disruptive/Aggressive Behavior by Student*

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of disruptive/aggressive behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>MikeS1</td>
<td>Not available</td>
<td>0.5%</td>
</tr>
<tr>
<td>DavidS2</td>
<td>ADHD, ODD</td>
<td>0.9%</td>
</tr>
<tr>
<td>SashaS3</td>
<td>LD</td>
<td>0.8%</td>
</tr>
<tr>
<td>AnthonyS4</td>
<td>LD</td>
<td>0.3%</td>
</tr>
<tr>
<td>TonyS5</td>
<td>ADHD</td>
<td>0.6%</td>
</tr>
<tr>
<td>GabrielS6</td>
<td>ADHD, LD</td>
<td>2.0%</td>
</tr>
<tr>
<td>NicoleS7</td>
<td>Not available</td>
<td>4.2%</td>
</tr>
<tr>
<td>TylerS8</td>
<td>Not available</td>
<td>0.5%</td>
</tr>
<tr>
<td>SophieS9</td>
<td>ADHD</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase (+) or decrease (-) in percentage points between baseline and treatment. The dotted line groups students within the same classroom.
3.4 Student Acquiescent Measure

The sessional percentage of acquiescent behavior during baseline, treatment, and follow-up for each student is illustrated in Figure 6. The percentage of acquiescent behavior for each session was calculated by dividing the total number of acquiescent responses by the total number of acquiescent and non-acquiescent responses and multiplying by 100. For each phase, the dotted lines on the graph represent the mean acquiescent behavior for that phase. As can be seen in the figure, all nine students demonstrated improvements in acquiescent behavior from baseline to treatment. These improvements were maintained during the follow-up phase.

PAND for acquiescent behavior across all nine students was 80%. The ES found using PAND for acquiescent behavior was large ($\Phi = 0.52$). Visual analysis of levels (see Appendix P) showed variability during baseline for all 9 students but improvements during treatment and follow-up phases. Trend analysis (see Appendix Q) showed variability during baseline, slight acceleration for 5 of the 9 students during treatment, and slight acceleration for all of the students except for Tyler$_{S8}$ during follow-up.
Figure 6. Percentage of acquiescent behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean levels of acquiescent behavior during that phase.
Table 13 depicts the mean levels of acquiescent behavior for each student during baseline, treatment, and follow-up. The overall mean increase of acquiescent behavior across all nine students from baseline to treatment is 51 percentage points.

Table 14 shows the mean levels of acquiescent behavior for each classroom during baseline, treatment, and follow-up. Classroom 2 (Home-School Program) displayed the largest increase in acquiescent behavior with 66 percentage points. Similar improvements in acquiescent behavior were observed in Classroom 1 (Grade 4/5) and 3 (Grade 3).

Table 13

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of acquiescent behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Mike_{S1}</td>
<td>Not available</td>
<td>56%</td>
</tr>
<tr>
<td>David_{S2}</td>
<td>ADHD, ODD</td>
<td>44%</td>
</tr>
<tr>
<td>Sasha_{S3}</td>
<td>LD</td>
<td>27%</td>
</tr>
<tr>
<td>Anthony_{S4}</td>
<td>LD</td>
<td>51%</td>
</tr>
<tr>
<td>Tony_{S5}</td>
<td>ADHD</td>
<td>8%</td>
</tr>
<tr>
<td>Gabriel_{S6}</td>
<td>ADHD, LD</td>
<td>53%</td>
</tr>
<tr>
<td>Nicole_{S7}</td>
<td>Not available</td>
<td>25%</td>
</tr>
<tr>
<td>Tyler_{S8}</td>
<td>Not available</td>
<td>46%</td>
</tr>
<tr>
<td>Sophie_{S9}</td>
<td>ADHD</td>
<td>42%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment. The dotted line groups students within the same classroom.
Table 14

*Mean Levels of Acquiescent Behavior by Classroom*

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Student</th>
<th>Mean percentage of acquiescent behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Classroom 1 (Grade 4/5)</td>
<td>Mike_{S1}, David_{S2}</td>
<td>50%</td>
</tr>
<tr>
<td>Classroom 2 (Junior Home-School Program)</td>
<td>Sasha_{S3}, Anthony_{S4}, Tony_{S5}</td>
<td>29%</td>
</tr>
<tr>
<td>Classroom 3 (Grade 3)</td>
<td>Gabriel_{S6}, Nicole_{S7}, Tyler_{S8}, Sophie_{S9}</td>
<td>41%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment.

### 3.5 Student Covariant Measure

**Compliance.** Compliance was not formally targeted in this study (i.e., we did not train teachers how to increase student compliance); we therefore evaluated compliance as a measure of covariant training effects. Figure 7 illustrates the sessional percentage of compliance for each student throughout all three phases of the study. The percentage of compliance for each session was calculated by dividing the total number of compliant responses by the total number of requests delivered and multiplying by 100. The dotted lines on the graph show the mean levels of compliance for baseline, treatment, and follow-up. As can be seen from the graph, compliant behavior increased for all nine students from baseline to treatment. PAND for compliant behavior was 73%. The ES calculated based on PAND was moderate (*Phi* = 0.36). For all but two students (Gabriel_{S6} and Tyler_{S8}), treatment gains were maintained during follow-up.

Visual analysis of compliant behavior levels (see Appendix R) showed variability during baseline and improvements during treatment and follow-up. Trend analysis (see Appendix S)
indicated variability during baseline and slight acceleration during treatment. Overall, stability improved during the progression of each study phase.
Figure 7. Percentage of compliant behavior during baseline, treatment, and follow-up.

Note. The dotted lines represent the mean levels of compliant behavior during that phase.
Table 15 shows the mean levels of compliant behavior for each student during baseline, treatment, and follow-up. The overall mean increase of compliant behavior across all nine students from baseline to treatment was 27 percentage points.

Table 16 illustrates the mean levels of compliant behavior for the three classrooms during each phase of the study. Classroom 1 (Grade 4/5) showed the greatest increase in compliant behavior from baseline to treatment with 45 percentage points. Classroom 2 (Home-School Program) and 3 (Grade 3) displayed similar increases in compliant behavior with 20 and 22 percentage point gains respectively.
Table 15

*Mind Levels of Compliant Behavior by Student*

<table>
<thead>
<tr>
<th>Student</th>
<th>Diagnosis</th>
<th>Mean percentage of compliant behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Mike</td>
<td>Not available</td>
<td>27%</td>
</tr>
<tr>
<td>David</td>
<td>ADHD, ODD</td>
<td>36%</td>
</tr>
<tr>
<td>Sasha</td>
<td>LD</td>
<td>75%</td>
</tr>
<tr>
<td>Anthony</td>
<td>LD</td>
<td>88%</td>
</tr>
<tr>
<td>Tony</td>
<td>ADHD</td>
<td>49%</td>
</tr>
<tr>
<td>Gabriel</td>
<td>ADHD, LD</td>
<td>54%</td>
</tr>
<tr>
<td>Nicole</td>
<td>Not available</td>
<td>53%</td>
</tr>
<tr>
<td>Tyler</td>
<td>Not available</td>
<td>56%</td>
</tr>
<tr>
<td>Sophie</td>
<td>ADHD</td>
<td>61%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment. The dotted line groups students within the same classroom.
Table 16

*Mean Levels of Compliant Behavior by Classroom*

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Student</th>
<th>Mean percentage of compliant behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Classroom 1 (Grade 4/5)</td>
<td>Mike$<em>{S_1}$, Davids$</em>{S_2}$</td>
<td>31.4%</td>
</tr>
<tr>
<td>Classroom 2 (Junior Home-School Program)</td>
<td>Sasha$<em>{S_3}$, Anthony$</em>{S_4}$, Tony$_{S_5}$</td>
<td>70.4%</td>
</tr>
<tr>
<td>Classroom 3 (Grade 3)</td>
<td>Gabriel$<em>{S_6}$, Nicole$</em>{S_7}$, Tyler$<em>{S_8}$, Sophie$</em>{S_9}$</td>
<td>56.0%</td>
</tr>
</tbody>
</table>

*Note.* The number in brackets is the mean increase in percentage points between baseline and treatment.

### 3.7 Functional Relationships

Functional relationships between teacher and student behavior are illustrated in Figures 8, 9, and 10. Figure 8 shows mean teacher reinforcement behavior in conjunction with mean student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up. As shown on the graph, increases in teacher use of reinforcement coincided with improvements in student acquiescence, on-task and compliance throughout baseline and treatment.

Figure 9 depicts mean teacher antecedent behavior in conjunction with mean student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up. As can be seen from the graph, there was little to no change in teacher antecedent behavior throughout each phase of the study; however, improvements were evident in student acquiescence, on-task, and compliance from baseline to treatment.
Figure 10 illustrates mean teacher reactive behavior in conjunction with mean student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up. As can be seen from the graph, decreases in teacher reactive behavior coincided with improvements in student acquiescence, on-task, and compliant behavior throughout baseline and treatment phases.
Figure 8. Mean teacher reinforcement behavior and student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up.
Figure 9. Mean teacher antecedent behavior and student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up.
Figure 10. Mean teacher reactive behavior and student behavior (acquiescence, on-task, and compliance) during baseline, treatment, and follow-up.
Chapter 4: Discussion

This study was conducted to determine the efficacy of ECM to improve student behavior in general and special education classrooms. After ECM training, teachers increased their use of reinforcement strategies and decreased their use of reactive approaches in the classroom. Although statistical analysis indicated a moderate effect for teacher use of antecedent strategies, visual analyses indicated minimal or no change in antecedent strategy use after training. Improvements in reinforcement and reactive behavior were sustained during follow-up at 3 months. Before intervention, students had difficulty staying focused on academic tasks and interacting prosocially with peers. After teacher training, students’ on-task behavior and acquiescence to peer requests improved considerably. Follow-up observations indicated that treatment gains were maintained up to 3 months after treatment termination. In addition, covariant improvement in student compliance to teacher requests, a skill that was not specifically targeted for intervention, was evident.

4.1 Teacher Measures

Reinforcement. Before intervention, all three teachers showed relatively low levels of reinforcement strategy use, but demonstrated improvement after training and maintained these gains into the follow-up period. In addition, all of the students showed considerable improvements in on-task and acquiescent behavior immediately after teacher training, suggesting that teacher reinforcement may have had the predicted positive effect on student responding. Of note, John demonstrated the greatest increase in reinforcement behavior and the students in his classroom showed the highest increase in acquiescent behavior.

Research supports the role of teacher reinforcement in increasing appropriate student behavior and decreasing problem behavior (Fullerton et al., 2009, Partin et al., 2010). In particular, teacher praise can lead to improvements in on-task skills (Ferguson & Houghton,
1992; Sutherland, Wehby, & Copeland, 2000) and prosocial behavior (Martens et al., 1997). By providing contingent praise and rewards following displays of on-task and acquiescent responding, teachers in the present study may have reinforced these responses and increased their future likelihood (Fullerton et al., 2009).

It is important to note that the increase in student prosocial behavior following teacher training may have provided further opportunities for teachers to reinforce student responding, potentially contributing to further increases in teacher use of this strategy. Researchers have noted that such a transactional process between students and teachers can produce reciprocal effects that promote further student engagement and positive teacher behavior (Sutherland & Oswald, 2005). Conversely, students who display disruptive behavior provide fewer opportunities for reinforcement of prosocial behavior and may, in fact, elicit more negative responses from teachers (Nelson & Roberts, 2000; Sutherland, Wehby, & Yoder, 2002).

**Antecedent strategies.** Immediately after teacher training, there appeared to be a brief burst in antecedent strategy use (at least for Anna\textsubscript{T1} and John\textsubscript{T2}), but otherwise time series graphs showed no clinically significant improvement (notwithstanding the statistically significant finding. There are several possible explanations for these findings. First, all three teachers displayed moderate levels of antecedent behavior during baseline that coincided with the beginning of the school year, when teachers spend more time providing support to help students follow new classroom routines. As students adjusted to academic demands, teachers may have naturally reduced their use of antecedent approaches to match student needs. Thus, although training may have prompted teachers to maintain their levels of support, students may have had less need for antecedent assistance. Moreover, teachers were taught to fade support strategies once students began demonstrating prosocial responding consistently. Considering the quick improvements in student skill use, teachers may have determined that antecedent strategies could
be reduced sooner rather than later in the school year. Finally, all three teachers noted that they found it more challenging to implement antecedent approaches (in comparison to other strategies) due to the large number of students in their classrooms and the expectation to cover school curriculum. This may have resulted in less use of these support strategies by teachers after intervention than desired.

It should be noted that data were not collected on how closely teachers followed acquiescent lessons plans, even though these teacher behaviors could be classed as antecedent approaches. Such data may have been informative as one research assistant noted after informal observation that John_{T2} used more role-plays to explain flexing to students in his class than other teachers (in the classroom of John_{T2}, students consistently demonstrated high levels of acquiescence after ECM training).

**Reactive Strategies.** Prior to intervention, teachers displayed moderate levels of reactive behavior. After intervention, the frequency of reactive behavior decreased considerably for all three teachers and remained at lower levels during follow-up. It is important to note that student prosocial behavior increased when teacher reactive behavior reduced. Although the study design made it difficult to determine which aspects of ECM were most potent, these data suggest that the reduction in reactive approaches was at least partially associated with student behavioral improvements. There are various possible explanations for this potential relationship.

First, extensive use of reactive rather than proactive approaches by teachers as a means of dealing with student problem behavior in baseline may have reduced opportunities for students to learn appropriate alternative behavior for managing difficult circumstances (Sutherland & Oswald, 2005). When teachers use only reactive approaches as management strategies, students may become much more focused on what not to do rather than how to effectively cope with demanding situations.
Second, some of the teacher reactions to student problem responses may have served to reinforce those behaviors, making it more likely for conduct problems to recur (Maag, 2001; Mayer, 2001). Students who respond disruptively as a means of accessing teacher attention may develop long term disruptive strategies if such behaviors are effective at setting of negative reactions from teachers (Smith & Misra, 1992). Alternatively, some students may respond with problem behavior when faced with challenging classroom demands. If teachers send them to the hallway or to timeout under such circumstances, the ensuing escape from demanding tasks may serve as a reinforcer, increasing the future probability of problem behavior (Maag, 2001; Mayer, 2001).

Finally, use of reactive approaches by teachers in baseline may have compromised the development of warm teacher-student relationships. Students who are repeatedly reprimanded may harbor negative feelings and resentment towards teachers (Lukowiak & Bridges, 2010). Given the many potential problems associated with reactive approaches, it is not surprising that as teachers decreased their use of reprimands, negative statements, and time-outs in the present study, student behavior improved.

4.2 Student Measures

On-task, off-task, and neutral behavior. Before teacher training, most of the students demonstrated low levels of on-task behavior. After teacher training, all 9 students showed considerable improvement in on-task responding and reductions in off-task behavior. Increases in student engagement were maintained during follow-up periods. Moreover, the percentage of neutral behavior decreased from baseline to treatment phases (21% to 8% respectively). Given this reduction, it is likely that much of the neutral behavior was in fact off-task behavior that may have appeared ambiguous (i.e., student staring at a worksheet without any output).
Given the specific nature of the improvements that occurred in teacher skills following training, it may be useful to consider how these changes likely affected student behavior. One component of ECM focused on increasing teachers’ use of antecedent approaches (i.e., prompting, priming, reducing academic demands). Although teachers used antecedent approaches in the classroom, the frequency of use remained at similar levels in both baseline and treatment, at least according to the visual analysis. Based on the results of this study, it appears unlikely that teacher use of antecedent supports was the primary catalyst for this improvement in student on-task behavior.

However, other components of ECM focused on increasing teacher praise for student on-task behavior and decreasing negative teacher reactions (i.e., reprimands) for off-task responding. Visual and statistical analyses indicated substantial increases in teacher use of reinforcement and reduction in use of reactive strategies. These positive changes in teacher responding likely played a key role in the improvement of student on-task abilities by increasing student motivation to demonstrate prosocial responses (Fullerton et al., 2009; Ferguson & Houghton, 1992; Skinner & Belmont, 1993; Way, 2011). Praising and rewarding students for working at and completing academic tasks provides teacher recognition of student effort, which increases the likelihood of future task completion (Williams & Williams, 2011). Further, praise can help students develop feelings of competency, making them aware that they are capable of fulfilling teacher expectations (Sutherland et al., 2000). Although praise begins as an external motivator, it may be internalized by students when they experience success and gain awareness of their abilities (Deci, Ryan, and Williams, 1996). In contrast, the absence of reinforcement for appropriate behavior or reprimands for misbehaving, can reduce subsequent motivation and engagement for similar tasks (Urdan & Schoenfelder, 2006).
In addition, praising students can foster more positive teacher-student interactions (Murray & Malmgren, 2005). By encouraging students and labeling their successes, teachers can facilitate more supportive relationships with students (Ahnert, Harwardt-Heincke, Kappler, Eckstein-Madry, & Milatz, 2012; Alderman & Green, 2011). In comparison, teachers who frequently use reactive approaches to deal with inappropriate behavior may increase levels of teacher-student conflict (Driscoll & Pianta, 2010; Way, 2011). Although it is difficult to draw firm conclusions about contributory variables given design limitations, the current findings suggest that increasing teacher reinforcement and praise and decreasing reactive approaches are an effective means of improving student on-task skills (Mather & Goldstein, 2001).

**Acquiescent behavior.** Prior to teacher training, teachers reported that students showed a wide range of difficulties in their peer interactions; baseline measurements confirmed that acquiescence was a specific social skills problem of participant students. After intervention, most students demonstrated significant improvement in their ability to flex in interactions with their peers. Effect size based on PAND indicated a large treatment effect that was maintained up to 3 months after termination of treatment, although Gabriel demonstrated improvement several days before treatment initiation, making it more difficult to ascribe the change in behavior to the intervention for this participant.

Teacher use of lesson plans (see Appendix G) that targeted specific acquiescent skills (i.e., listening to others, keeping your cool) likely contributed to the large treatment effect. As mentioned previously, one research assistant reported that John used more role-plays in his class, which may have led to the greater improvements in acquiescent behavior for the students in his class (Sasha, Anthony, and Tony). For each acquiescence lesson, teachers defined the target skill, provided examples, and illustrated the concept through role-plays. These explicit lesson plans likely served as antecedent supports that prompted student acquiescent responding.
It should be noted that John\textsubscript{T2} and Sarah\textsubscript{T3} reported that they preferred having such lesson plans because it provided clear-cut information to teachers on what to do that was presented in a format they were familiar with.

Additionally, teacher use of reinforcement strategies corresponded with improvements in student acquiescent behavior. More specifically, John\textsubscript{T2} displayed the largest increase in reinforcement (11 behaviors per session) which coincided with the large increase in acquiescence in Classroom 2 (65 percentage points). Anna\textsubscript{T1} and Sarah\textsubscript{T3} demonstrated smaller increases in reinforcement (4 and 5 behaviors per session, respectively) that corresponded with smaller improvements in acquiescence (40 and 45 percentage point increases, respectively). Although the study design does not allow firm conclusions to be drawn about the effects of reinforcement on acquiescent behavior, the data suggest the possibility of contributory effects. As an alternative or complementary explanation for this possible relationship, higher frequencies of student acquiescence after intervention (as prompted by the acquiescence lesson plans used by teachers) may have provided more opportunities for teacher reinforcement of prosocial responding.

**Compliant behavior.** The ECM intervention was also associated with covariant change in student behavior that was not specifically targeted for intervention. Although teacher training focused solely on acquiescent and on-task skills, increases in student compliance were also evident after intervention. Note, however, that both Sasha\textsubscript{S3} and Anthony\textsubscript{S4} displayed high levels of compliant behavior during baseline (with many 100% compliance days) rendering further substantial gains unfeasible for these students.

The overall improvement (mean increase of 27 percentage points) in student compliance provides further evidence for the keystone characteristic of on-task and acquiescence (Barnett et al., 1996; Ducharme & Shecter, 2011). As previously mentioned, the keystone effect is most
commonly explained by the concept of response class: when multiple behaviors belong to the same response class, intervening with one behavior may result in untargeted change in another response (Kazdin, 1982b). In this study, it is likely that off-task behavior, peer conflict, and noncompliance served similar functions for students, such as escaping classroom demands or challenging interpersonal situations. By teaching and reinforcing specific social and school-work related student behavior, teachers may have reduced student need to ignore or oppose teacher directives, given that these new skills would likely play a role in decreasing the aversiveness of many classroom demands.

**Disruptive/aggressive behavior.** Baseline levels of disruptive/aggressive behavior ranged from 0.3% to 4.2%. Such low percentages created a floor effect, leaving little room for further reduction. Although minor fluctuations in disruptive/aggressive behavior were observed after teaching training, there was not enough variability to determine trends in the data or intervention effects.

**4.3 Limitations and Future Research**

This study investigated the effects of ECM in one special education and two general education classrooms. Although the sample size of 9 students and 3 teachers is considered large for a time series study (given the extensive resources required to do time series observations), future studies should incorporate larger numbers of students and evaluate treatment efficacy in group designs or randomized control trials. Such studies could also be designed to allow the inclusion of a more diverse student sample, given that the current study took place at a school within a generally affluent neighborhood. It would be useful to determine if similar training effects could be obtained with students from at-risk communities who may exhibit more severe behavioral problems or have fewer resources for support.
In addition, it would be beneficial to examine whether ECM was associated with generalization effects in different settings. For instance, it is unclear whether ECM increased student engagement in other classes (i.e., music or gym) or during homework completion at home. Broader evaluations in the school, home-based observations, or pre- and post-questionnaires completed by parents would provide information on the persistence of intervention effects in settings other than in the classroom of the trained teacher.

A limitation of the study was the short follow-up period. The completion of intervention was near the end of the school year and as such, we were unable to determine the extent to which intervention effects maintained beyond the 3-month period. Future studies should evaluate whether students continued to display gains in the following school year. It would also be useful to determine whether teachers maintained their use of ECM skills with new students through teacher observations in subsequent school years.

Another limitation of the study was the absence of certain teacher skill measures. Specifically, the ECM approach involved lesson plans designed to teach the skill of acquiescence to students. However, we did not include measures to evaluate how closely teachers adhered to these plans. In fact, although all teachers were encouraged to teach flexing by providing definitions, examples, and role-plays (see Appendix G), one teacher appeared to use role-plays more frequently with students, potentially leading to greater gains in student acquiescence. An observational checklist of teacher skills during acquiescence lessons would provide useful procedural integrity information.

Further, an important aspect of the ECM program involves fading of antecedent approaches and reinforcement once students begin to demonstrate consistent proactive skill use. However, our observational system was not designed to evaluate whether such fading occurred and whether such reductions in use of antecedent approaches was warranted. In the present
A third limitation of the study was the lack of component analysis. Based on the observational measures used in this study, it is unclear which component or combination of components in ECM led to improvements in student behavior. For example, simple reduction in reactive strategies appeared to be a potent strategy for increasing prosocial behavior in students, but the design did not allow firm conclusions about this. A component analysis could be conducted with individual components or in a sequential format, with the sequence altered for different groups of participants to control for sequence effects.

A similar process could be used to determine which keystones are most responsible for desired behavior change. In the current study, targeting acquiescence and on-task behavior was associated with an untargeted increase in compliance. Given the keystone nature of both acquiescence and on-task skills, it is possible that training in only one of these skills could be enough to produce broader student gains. Component analysis of each of these skills would allow the development of the most practical and efficient approach to improving student behavior.
Based on the results of this study, teachers can likely improve student on-task, acquiescence, and compliance through increases in reinforcement of prosocial student behavior and reductions in reactive strategy use. Praising students, especially with behavior-specific praise, has been shown to improve student conduct (Haydon, Musti-Rao, 2011; Reinke et al., 2007). When teachers explicitly label and reinforce target behaviors (i.e., flexing, completing work), students are more likely to learn teacher expectations and appropriate responses (Reinke et al., 2007).

In addition to providing reinforcement, teachers may produce substantial positive changes in classroom management by reducing their use of reactive approaches (i.e., reprimands, time-outs). The strategies teachers use in response to student behavior is a key factor in creating a positive classroom environment (Conroy, Sutherland, Snyder, Al-Hendawi, & Vo, 2009). When teachers respond in a harsh manner, they are more likely to encounter problematic responses from students (Conroy et al., 2009). Conversely, proactive strategy use by teachers can improve overall student-teacher relationships (Adelman & Taylor, 2005). Such positive relationships can help facilitate a warmer classroom environment that supports student learning (Ahnert, 2012; Djigic & Stojiljkovic, 2011).

In summary, ECM shows promise as a classroom management approach for both general and special education teachers. This intervention has the potential to increase positive teacher behavior and improve student engagement and prosocial behavior. The covariant improvements in student compliant behavior add further evidence for the keystone effects of the targeted intervention skills (Barnett et al., 1996). Within School-Wide Positive Behavior Support, ECM may be useful as a second tier intervention. Once school-wide expectations are determined through first tier strategies, ECM could be implemented as a classroom group intervention focusing on students who display moderate levels of conduct problems. The current data on
ECM suggests that this treatment approach may address some of the core behavioral challenges that teachers face in classrooms.
References


Sutherland, K. S., Wehby, J. H., & Yoder, P. J. (2002). Examination of the relationship between teacher praise and opportunities for students with EBD to respond to academic requests. *Journal of Emotional and Behavioral Disorders, 10*(1), 5–13. doi: 10.1177/106342660201000102


Appendix A

Teacher Behavior Observation Sheet

Date of observation: _______________
Participant Number: _______________
Completed by: ______________________
Baseline______ Treatment ________ FUP _______

<table>
<thead>
<tr>
<th>REINFORCEMENT</th>
<th>ANTECEDENT BEHAVIORS</th>
<th>REACTIVE RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>Reward</td>
<td>Prompt/scaffold</td>
</tr>
<tr>
<td>1</td>
<td></td>
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<td>2</td>
<td></td>
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<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Teacher Demographics Questionnaire

1. Gender: Male____ Female ____
2. Age: ______
3. Total number of years teaching/assisting: ________
4. Number of years teaching/assisting special education: ________
5. Number of years teaching/assisting general education (regular classroom): ________
6. Circle the grade level(s) you are currently teaching/assisting:

   JK  SK  1  2  3  4  5  6  7  8  9  10  11  12

7. Circle the grade level(s) you have previously taught/assisted:

   JK  SK  1  2  3  4  5  6  7  8  9  10  11  12

8. Please describe the training (if any) you have had in classroom management.
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
Appendix C

Staff Consumer Satisfaction Scale

Instructions: Please circle the number that best describes your opinion:

1. I am satisfied with the quality of the classroom management strategies I was provided with.  
   ![Circle Scale]

2. My classroom management needs were met by the teacher training program.  
   ![Circle Scale]

3. I would recommend this teacher training program to other teachers.  
   ![Circle Scale]

4. I am now able to prevent behavior problems more effectively in the classroom.  
   ![Circle Scale]

5. I am now able to manage disruptive behaviors more effectively in the classroom.  
   ![Circle Scale]

6. How much did the teacher training intervention help with the specific problems that led you to take part in this intervention?
   
   ![Table]

7. Tell us what you liked most about the teacher training program.
   
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

8. Tell us what you liked least about the teacher training program.
   
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
Appendix D

On-task Data Sheet

Participant Number: ___________________  Completed by: ___________________

Date: ____________________________

1:1 Support_____  Independent work_____  Group work _____
Baseline_____  Treatment ______  FUP ______

**Partial Interval Recording (10 secs intervals):** Circle ON if on-task for 5 secs or more during interval; OFF if off-task for 5 secs or more during interval; N if neutral for 5 secs or more or more during interval; AGG if disruptive/aggressive at any time during the interval when the student is on or off task (not mutually exclusive).

<table>
<thead>
<tr>
<th>Code</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
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Appendix E

Compliance and Acquiescence Observation Sheet

Date of observation: _______________
Participant Number: _______________
Completed by:____________________
Baseline_____     Treatment ______     FUP ______

**Compliance:** Students are considered compliant (circle C) if the appropriate response to the teacher/classroom staff request is initiated within 10 seconds of the request and the students follows through on completion in a reasonable period of time.

**Noncompliance:** Students are considered non-compliant (circle NC) if any of the following three situations occur in response to a teacher/classroom staff request: 1) took longer than 10 seconds to begin the appropriate response, 2) students begin, but do not finish the task, and 3) teacher is required to repeat the request.

**Acquiescence:** Students are considered acquiescent (circle A) if they engage in peer compliance by fulfilling a demand/request within 10 seconds and complete the request in a reasonable amount of time. Students are also considered acquiescent if they “keep their cool” when provoked by a peer.

**Nonacquiescence:** Students are considered nonacquiescent (circle NA) if they do not comply with a peer demand/request within 10 seconds or become upset, yell, etc. when provoked by a peer.

<table>
<thead>
<tr>
<th>Class Activity</th>
<th>Compliance to teacher requests</th>
<th>Acquiescence to peer requests or provocations</th>
<th>Notes/Salient Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>C     NC</td>
<td>A    NA</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>C    NC</td>
<td>A    NA</td>
<td></td>
</tr>
</tbody>
</table>
Appendix F

Example of a PAND 2 x 2 Table

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Baseline</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>cell a</td>
<td>cell b</td>
<td>a + b</td>
</tr>
<tr>
<td>Lower</td>
<td>cell c</td>
<td>cell d</td>
<td>c + d</td>
</tr>
<tr>
<td>Total</td>
<td>a + c</td>
<td>b + d</td>
<td>100%</td>
</tr>
</tbody>
</table>

Effect size (ES) was calculated from a balanced 2 x 2 table with the formula $\phi = \frac{a}{(a + c)} - \frac{b}{(b + d)}$ that is explicitly described in Parker et al. (2007). The table was created by determining the percentage of intervention data points that overlapped with baseline data points for all of the students. This percentage was then divided by two and placed in cells $c$ and $b$. The value of cells $c$ and $b$ were subtracted from the percentage of baseline data points and intervention data points and the resulting values were placed in cells $a$ and $d$.

Example of effect size calculation for teacher reinforcement behavior:

$$\phi = \frac{29.09}{(29.09 + 9.1)} - \frac{9.1}{(9.1 + 52.71)}$$

$$\phi = 7.6 - 0.15$$

$$\phi = 0.61$$
Appendix G

Transcribed Content from Staff Training Handout

Keystone Skills and Strategies for Implementation

What are Keystone Skills?

- Skill that when taught is likely to result in a broad range of behavioral improvements
- More efficient strategy than focusing on individual target behaviors
- Provides students with essential skills to handle challenges more effectively

1. On-task Skills

1. **Build rapport** with students: i.e., pleasant conversation about interests/engage in play/listen empathically before an academic activity
   - Example: discuss weekend activities, upcoming holidays, have engaging interactions during recess
2. **Prompt** students to work: i.e., help student to start task by beginning sentence, pointing to a question, clarifying task instructions, etc.
3. **Embed** short durations of challenging tasks into longer durations of teacher-supported tasks
   - Begin by helping the student complete a few questions of his/her work
   - Leave the student to work independently for a short duration of time (i.e., 1 or 2 minutes)
   - When the independent period is over, return to the student and praise him/her for effort by saying “Great job working while I was away!” or “Fantastic! You did that on your own.”
   - The next day, increase the duration of independence by a short amount (i.e., 1 minute).
4. **Provide reinforcement**
   Catch students in “on-task moments” and praise/reinforce for working independently
   - Example: when student is writing, tell him “Great job doing that on your own.”
   - Example: noticing that a student is on-task across the room and saying “James, I see you working independently, fantastic!”

2. Acquiescence/Social Skills

Teaching the skill to students:

- Initially, teach students the concept of “flexing” - being able to cooperate with others by sometimes letting them have their way and being able to keep your cool when things don’t go your way
- Remind students of the concept of flexing and tell them how you’re going to help them to flex with each other
- Before a group activity, review acquiescence skills for 5 minutes. During the group activity, model, prompt, role-play, and reinforce students so they learn to flex.
- Encourage students to use the word “flex” in these situations and to compliment one another for flexing
- During the group activity, prompt students to invite peers, to wait their turn, to share, etc.
During negative peer interactions, focus your attention on the student who is not the aggressor (i.e., who is able to keep their cool, go along with other’s ideas, etc.) if possible.

Role-playing:
- Choose a ‘skill of the day’ and introduce it to your students at a specified time (e.g., before a group activity). Demonstrate appropriate uses of the skill and have students practice role-playing appropriate skill use.
- Example: ask two students to demonstrate what “helping” looks like. Then ask the students to demonstrate what “not helping” looks like. After the role-play, discuss the differences between the two scenarios with your class.

Skill areas:
1. Helping & sharing
2. Listening and going along with someone else’s ideas
3. Keeping your cool when things aren’t going your way
4. Approaching others and inviting others to join in
5. Complimenting and thanking others
6. Sticking up for yourself
Appendix H

Teacher Reinforcement Behavior Level and Variability

Baseline | Treatment | Follow-up

Anna T1

John T2

Sarah T3

Frequency of Reinforcement Behavior

Sessions

Baseline

Treatment

Follow-up

Sessions
Appendix I

Teacher Reinforcement Behavior Trend

Baseline  | Treatment  | Follow-up

Anna

John

Sarah
Appendix J

Teacher Antecedent Behavior Level and Variability

Baseline  Treatment  Follow-up

Anna_{T1}  John_{T2}  Sarah_{T3}

Frequency of Antecedent Behavior

Sessions
Appendix K

Teacher Antecedent Behavior Trend

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Baseline Sessions</th>
<th>Treatment Sessions</th>
<th>Follow-up Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anna $T_1$</td>
<td>1 6 11 16 21 26 31</td>
<td>36 41 46</td>
<td></td>
</tr>
<tr>
<td>John $T_2$</td>
<td>1 6 11 16 21 26 31</td>
<td>36 41 46</td>
<td></td>
</tr>
<tr>
<td>Sarah $T_3$</td>
<td>1 6 11 16 21 26 31</td>
<td>36 41 46</td>
<td></td>
</tr>
</tbody>
</table>
Appendix L

Teacher Reactive Behavior Level and Variability

[Graph showing the frequency of reactive behavior for Anna, John, and Sarah across Baseline, Treatment, and Follow-up sessions.]
Appendix M

Teacher Reactive Behavior Trend

Session frequency trends for Anna, John, and Sarah across Baseline, Treatment, and Follow-up phases.
Appendix N

Student On-task Level and Variability

- Mike $S_1$
- David $S_2$
- Sasha $S_3$
- Anthony $S_4$
- Tony $S_5$
- Gabriel $S_6$
- Nicole $S_7$
- Tyler $S_8$
- Sophie $S_9$
Appendix O

Student On-task Trend

Percentage of On-task

Mike

David

Sasha

Anthony

Tony

Gabriel

Nicole

Tyler

Sophie

Appendix O
Appendix P

Student Acquiescent Level and Variability

Percentage of Acquiescence

Mike

David

Sasha

Anthony

Tony

Gabriel

Nicole

Tyler

Sophie

0%
20%
40%
60%
80%
100%

1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86
Appendix Q

Student Acquiescent Trend

Percentage of Acquiescence

<table>
<thead>
<tr>
<th>Name</th>
<th>Percentage</th>
<th>Student ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike</td>
<td>100%</td>
<td>S1</td>
</tr>
<tr>
<td>David</td>
<td>100%</td>
<td>S2</td>
</tr>
<tr>
<td>Sasha</td>
<td>100%</td>
<td>S3</td>
</tr>
<tr>
<td>Anthony</td>
<td>100%</td>
<td>S4</td>
</tr>
<tr>
<td>Tony</td>
<td>100%</td>
<td>S5</td>
</tr>
<tr>
<td>Gabriel</td>
<td>100%</td>
<td>S6</td>
</tr>
<tr>
<td>Nicole</td>
<td>100%</td>
<td>S7</td>
</tr>
<tr>
<td>Tyler</td>
<td>100%</td>
<td>S8</td>
</tr>
<tr>
<td>Sophie</td>
<td>100%</td>
<td>S9</td>
</tr>
</tbody>
</table>
Appendix R

Student Compliant Level and Variability

Percentage of Compliance

Mike

David

Sasha

Anthony

Tony

Gabriel

Nicole

Tyler

Sophie

0% 20% 40% 60% 80% 100% 120%
Appendix S

Student Compliant Trend

Percentage of Compliance

Mike $s_1$

David $s_2$

Sasha $s_3$

Anthony $s_4$

Tony $s_5$

Gabriel $s_6$

Nicole $s_7$

Tyler $s_8$

Sophie $s_9$