

The Effects of the Color Wheel System on Disruptive Behavior and Classroom Climate:  
Validating the Color Wheel in Kindergarten Classrooms

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## Dedication

This dissertation is dedicated to my grandparents, Bonnie and Jim Robbins, for their prayers, support, and for reminding me to trust in the Lord to direct me and to my husband Ryan for his support and encouragement through this process.

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## Abstract

The current study was initiated by a principal who was interested in implementing the Color Wheel System in her school. The purpose of the current study was to empirically validate the classroom management system for kindergarten students. Although there is some evidence that the procedure may be effective with kindergarten students, no scientific procedures have been applied to evaluate the Color Wheel System in kindergarten classrooms. Analyses were conducted on the average inappropriate vocalizations and out-of-seat behavior of the entire class (i.e., 16-17 students) across three classrooms. We also evaluated the effect of the Color Wheel System on students' perception of classroom climate. Students whose parents provided consent participated in a measure of classroom climate.

A multiple baseline design was used to evaluate the effects of the Color Wheel System on kindergarten students' inappropriate vocalizations and out-of-seat behavior. Across all phases, partial-interval recording and momentary time-sampling were used to record classwide inappropriate vocalizations and out-of-seat behavior respectively. Visual analysis of time series graphs showed immediate decreases in each dependent variable across classrooms when the intervention was applied. Results of the study revealed large effect sizes across phases for primary and secondary dependent variables. These data show that the Color Wheel System procedures effectively decreased inappropriate vocalizations and out-of-seat behavior in kindergarten classrooms. T-tests showed no significant changes in perception of classroom climate due to the Color Wheel System procedures.

Survey and interview data show that, overall, the teachers found the intervention helpful in their classrooms. Our findings have theoretical and applied implications. Study limitations and directions for future research are provided.

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## Chapter I

### **Literature Review**

Disruptive school behaviors are one of the most prevalent behavior problems in early childhood education (Murphy, Theodore, Aloiso, Alric-Edwards, & Hughes, 2007). Typical disruptive behaviors may include failure to follow directions, not attending to teacher directions or instructions, (McGoey, Schneider, Prodan, Rezzetano, & Tankersley, 2010), students frequently leaving their seats without permission (Carter, Clayton, & Stephenson, 2006; Choate, Skinner, Fearington, Kohler, & Skolits, 2008; Patterson, 2009), and talking out or making distracting noises without permission (Kirk et al., 2010). Young children who exhibit disruptive classroom behaviors are at risk for various academic and behavioral problems as they progress through school (McGoey et al., 2010; Murphy et al., 2007; Vitaro, Bredgen, Larose, & Tremblay, 2005).

Disruptive classroom behaviors not only adversely impact students who engage in them, but they may also impact teachers, peers, and the classroom climate (Fudge, Reece, Skinner, & Cowden, 2007; Luiselli, Putnam, & Sunderland, 2002; Saecker et al, 2008; Schmit, Alper, Raschke, & Ryndak, 2000; Yarbrough, Skinner, Lee, & Lemmons, 2004). Educators often spend an inordinate amount of time reacting to disruptive behaviors, which reduces their time to teach. Additionally, both the disruptive behaviors and teachers reactions to these behaviors often distract peers who are attempting to engage in sustained academic tasks. Because disruptive behaviors are often punished, the classroom climate can be adversely affected (Kearney & Peters, 2013). For example, students in environments with high levels of punishment may be less likely to actively

engage in activities (Doll, Spies, LeClair, Kurien, & Foley, 2010; Kearney).

Consequently, procedures designed to prevent inappropriate, disruptive classroom behaviors may have a positive impact on the classroom climate and student learning.

One of the most common classwide strategies used to prevent undesired, disruptive behaviors is to apply rules. These rules set behavioral expectations for all students. Some have suggested that classroom rules should include one set of few (e.g., three to five) rules that are designed to set behavioral expectations across all activities (Buck, 1999; Heins, 1996; Malone & Tietjens, 2000). Examples of such rules include ‘be respectful,’ ‘do your best,’ ‘keeps hands and feet to self,’ and ‘follow directions.’ In many instances, these rules resemble school rules.

Although classroom rules are common, student adherence to said rules is not guaranteed. To address this problem, educators often apply consequences for rule breaking behaviors. In most instances these consequences for rule breaking can be conceptualized as independent group oriented punishment. These contingencies are group oriented because for every member of the class or group, the same inappropriate behaviors are punished with the same consequences. Punishments often involve loss of privileges or the opportunity to engage in preferred activities such as computer time and recess (McGoey et al., 2010).

Despite the application of classroom rules and independent group oriented punishment system, many educators still spend an inordinate amount of time reacting to inappropriate rule-breaking behavior. For example, they may have to repeat directions, reprimand those who did not follow directions, or wait until all students comply with the

directions. Many of these reactions may lead to a reduction in time spent on instruction and in student learning (Fudge et al., 2007; Saecker et al, 2008; Schmit et al, 2000; Yarbrough et al., 2004). One solution to these problems has been to apply the Color Wheel System. The Color Wheel System breaks many of the rules about classroom rules. Specifically, rather than applying one set of classroom rules, the Color Wheel System incorporates different sets of rules for different classroom activities. Additionally, procedures are used to transition the classroom from one activity to another, while simultaneously transitioning from one set of rules to another (Blondin, Skinner, Parkhurst, Wood, & Snyder, 2012; Fudge et al., 2007; Fudge, et al., 2008; Kirk et al., 2010; Skinner & Skinner, 2007).

### **Limitations of Classroom Rules and Consequences**

The function of classroom rules is to set behavior expectations that occasion rule-following behavior. If rules are to be followed, they should be known, clear, and reasonable (Skinner & Skinner, 2007). One reason some recommend one set of three to five concise rules, is it easy for students, especially young students, to learn such a small number of brief rules (Buck, 1999). This small number of rules ensures student knowledge of the classroom rules. Developing clear and reasonable rules has proven a bit more challenging. Many classroom rules are so broad that they do not set clear expectations for behavior across various classroom activities. For example, ‘be respectful’ provides little information to a student who needs to know if he or she needs permission to go sharpen his or her pencil. Additionally, some rules that are very specific do not apply across all classroom activities. For example, ‘keep hands and feet to self’ or

‘keep seat in seat’ are not reasonable rules if the class is playing games such as duck-duck-goose.

Applying one set of a few vague classroom rules makes it difficult for students and teachers to know what behavioral expectations for each classroom activity (Fudge et al., 2008). This causes serious problems when teachers punish rule-breaking behavior that can have a detrimental effect on the classroom climate and student-teacher relations (Mantzicopoulos & Neuharth-Pritchett, 2003). For example, teachers who do not have a clear understanding of behavior expectations may punish one student contingent upon a specific behavior, but not another student.

In addition to causing problems with individual students, inconsistent punishment may have negative side effects across all students. If students are unclear how to behave and punishment is inconsistently applied, students find themselves in an environment where it is very hard to discern how to avoid punishment. Such environments can reduce all behaviors, including behaviors needed to learn academic and social skills. Additionally, such environments have been associated with a class of behaviors often referred to as learned helplessness (Seligman, 2002). Finally, such environments may encourage escape-avoidance behavior (e.g., avoiding school) which could present as separation anxiety and attachment disorder in students who are just beginning school (Birch & Ladd, 1996, Birch & Ladd, 1997; Pianta, Steinberg, & Rollins, 1995).

### **Alternative Classroom Rules and Consequences: The Color Wheel System**

High rates of disruptive behaviors may lead teachers to feel overwhelmed and unable to manage the classroom effectively. Academic productivity is reduced by

multiple disruptive students because teachers often have to spend more time addressing the inappropriate behaviors of a few students, thus detracting from the academic progress of non-disruptive students (McGoey et al., 2010). Preventative behavioral interventions may decrease disruptive behavior across all students (McGoey et al., 2010; Nelson, Martella, & Marchand-Martella, 2002); thereby increasing time available for teaching and learning. The Color Wheel System is a classroom management technique that can be effective at reducing disruptive behaviors by providing alternative rules for different classroom activities (Skinner, et al., 2007).

**The Color Wheel System.** The Color Wheel System was initially developed as a class-wide management system in a school serving students with emotional and behavioral disorders (EBD) (Skinner, Scala, Dendas, & Lentz, 2007) but has since been implemented in general education classrooms of varying grade levels including Kindergarten (Below, Skinner, Skinner, Sorrell, & Irwin, 2008), first grade (Kirk et al., 2010), second grade (Fudge et al., 2008), third grade (Kirk et al.), and fourth grade (Blondin et al., 2012). The Color Wheel System is a class-wide prevention technique that has consistently improved a variety of behaviors in elementary school classrooms by establishing clear antecedent stimuli (Blondin et al., 2012; Fudge et al., 2007; Fudge, et al., 2008; Kirk et al., 2010; Skinner & Skinner, 2007). The antecedent stimuli primarily include classroom rules that describe expectations for student behavior.

Rather than instituting one set of vague classroom rules, the Color Wheel System provides multiple sets of clear, classroom rules to make students more aware of expectations for different classroom activities (Coles et al., 2013). The original Color

Wheel System uses three sets of brief, clear rules for different classroom activities (Skinner & Skinner, 2007). Each set of rules is represented by one of three colors: red, green, or yellow. Red rules are designed to capture student attention so that the teacher can deliver instructions or directions. Red rules include statements such as ‘in seat,’ ‘no talking,’ ‘no hand-raising,’ and ‘eyes on speaker.’

Yellow rules are designed for academic tasks (i.e., seat work, recitations. ‘Raise hand to speak,’ ‘seat in seat,’ ‘eyes on speaker or work,’ ‘hands and feet to self,’ and ‘follow directions’ are typical Yellow rules. Yellow rules are designed to make it easier for students to learn without distractions.

Green rules are best used for free time activities in which students are allowed to appropriately socialize and leave their seats (Choate et al., 2008). Typical Green rules include statements such as use ‘inside voices to share with others,’ ‘hands and feet to self,’ ‘respect others,’ ‘follow directions.’ Visual cues provided by the Color Wheel help both teachers and students discriminate behavioral expectations of any given moment in time (Fudge et al., 2007).

**Transitions in the classroom.** One area that has improved because of the Color Wheel System is classroom transitions (Fudge et al., 2007). Transitions may include moving from setting to setting (e.g., classroom to bathroom, bathroom to gym) or from one in-class activity to another (e.g., math to reading groups, reading groups to seat work). While this may seem like a minor aspect of class time, approximately one to two hours may be spent transitioning in a single school day (Sainio, 1990; Schmit et al., 2000). Even the most experienced educators struggle to manage student behaviors during

transitions (Buck, 1999). When prompted to transition, those students who have not completed an activity may be hesitant to cease their activity to prepare for the next task. Because students complete tasks at varying paces, some students may spend much of a transition waiting for classmates to complete their work. As a result, students have more opportunities to display non-compliant behaviors; thus increasing the time spent transitioning and decreasing the time spent on instruction (Yarbrough et al., 2004).

By using the Color Wheel System, teachers can effectively manage classroom transitions by repeating simple procedures for moving from one classroom activity to another. For example, in moving from individual seat-work to large-group instruction, the teacher provides a warning (e.g. 2- minutes; 30-seconds) that the color wheel is moving to Red. Once the color wheel is on Red, students should be in their seats, with no materials on their desks, looking at the teacher. These procedures should enhance attention to teacher directions or instructions for the next activity. The teacher then provides instructions for moving to the next activity (e.g. “when the color wheel moves to yellow, quietly return to your seat and take out your writing workbooks”). While elementary classrooms often experience changes in routine, exceptions may be necessary for color wheel procedures. For example, some activities that involve the color wheel being on Yellow may allow students to get out of their seats without permission, which technically breaks Yellow rules. Therefore, teachers may use Red to explain any exceptions to color wheel rules.

**Out-of-seat behavior in the classroom.** Instructional time is often disrupted when students are out of their seats (Carter et al., 2006; Choate et al, 2008; Patterson,

2009). Out-of-seat behavior can be defined as a student having his or her waist to thighs off their assigned chair (or spot on carpet) without permission. Choate et al. (2006) applied the Color Wheel System to a rural first-grade classroom to reduce the rate of out-of-seat behavior. As evaluated through an AB design, the researchers found an immediate decrease in out-of-seat behavior upon implementation of the Color Wheel System. The percentage of students out-of-seat, which ranged from 19% to 41% during typical classroom management (TCM), dropped to 6.7% to 11% during the intervention. Researchers also collected data on one student identified by the teacher as struggling to stay in his seat more than his classmates. His out-of-seat behavior ranged from 59% to 81% during TCM, but dropped 2.5% to 3.8% after implementation of the Color Wheel System.

**Inappropriate vocalizations in the classroom.** Inappropriate vocalizations also disrupt teaching and learning (Ruiz-Olivares, Pino, & Herruzo, 2010). Inappropriate vocalizations have been defined as talking without permission and making audible vocalizations that may disrupt other students in the classroom including humming, making animal noises, and grunting (Kirk et al., 2010). Kirk et al. used the Color Wheel System to support typical classroom management procedures to reduce inappropriate vocalizations in first- and third-grade classrooms. Both grades showed immediate decreases in inappropriate vocalizations when the Color Wheel System was introduced. These results support other investigations which suggested that the Color Wheel System effectively reduces inappropriate classroom behaviors (Below et al., 2008; Choate et al.,

2007; Fudge et al., 2007; Hautau, Skinner, Pfaffman, Foster, & Clark, 2008; Saecker et al., 2008).

### **Classroom Climate**

In addition to increasing academic achievement, providing more time for quality instruction, and reducing teacher frustration and burnout, the Color Wheel System may also improve classroom climate (Below et al., 2008; Hautau et al., 2008; Saecker et al., 2008; Skinner & Skinner, 2007). Student satisfaction with his or her academic experience could enhance their level of academic engagement and achievement (Kearney & Peters, 2013). Because a student's initial years of schooling often set the tone for the remainder of his/her educational career, it is essential to establish positive classroom environments and relationships in early education (Baker, Dilly, Aupperlee, & Patil, 2003). Effective classroom management procedures may be essential to creating a positive classroom climate (Griffith, 2000). In recent years, researchers and educators have attempted to uncover the social characteristics of classrooms that promote students' success (Doll et al., 2010). In literature, this notion is known as classroom climate. Classroom climate may encompass areas such as relationships (student-teacher), friction, satisfaction, competitiveness, and independence (Fraser, 1998).

**Measures of classroom climate.** Several instruments have been designed to evaluate student- and teacher-perceptions of classroom climate. The majority of these measures are of surveys completed by students and/or teachers. Few measures have been developed to assess early elementary-age students' perceptions of classroom climate. In choosing a measure for the current study, four instruments were considered: *The*

*Learning Environment Inventory (LEI), Classroom Environment Scale (CES), My Class Inventory (MCI), and What Is Happening In This Classroom (WIHIC) Questionnaire.*

The LEI (Fraser, Anderson, & Walberg, 1982) contains 105 statements in 16 scales assessing relational, system maintenance and change, and personal development dimensions. The LEI has been normed primarily with high school students but has been used with children as young as grade five. Originating from a research study involving perceptions of various human environments, the CES (Fisher & Fraser, 1983) contains 90 statements and has been used to assess perceptions of classroom climate for students in secondary schools. The scale has been normed primarily in secondary school settings. The WIHIC questionnaire combines scales from existing surveys on classroom climate (Fraser, 1998). Test developers also added scales to address modern educational issues of equity and constructivism. The final version of the WIHIC includes 56 items. This scale has been used successfully in Singapore with over 2,000 high school students (Chionh & Fraser, 1998).

The MCI (Fisher & Fraser, 1981; Fraser et al., 1982; Fraser & O'Brien, 1985) was adapted from the LEI for children age eight to twelve years-old. The MCI was simplified for use in younger grades; therefore, it contains fewer items with simpler wording to enhance readability. While the final MCI contained 38 items, Fraser and O'Brien (1985) developed an abbreviated 25-item version. Even more recently, a revised short-form of the MCI (MCI-SF – Revised) was developed by Sink and Spencer (2005). The short version has been validated with students as young as second grade.

For the current study, we chose to use the MCI-SF - Revised which includes 20-items measuring four factors including: Cohesiveness, Friction, Satisfaction, and Competitiveness (Sink & Spencer, 2007). This instrument seemed the best fit given the age range of participants. The limited number of items could promote task completion in the kindergarten age range, and the dimension could provide valuable insight into the effectiveness of the Color Wheel System.

***Cohesiveness and friction.*** On the MCI-SF, Cohesiveness is defined as the degree to which there is a sense of collaboration and congeniality in the classroom. Items measuring cohesiveness include statements such as “all of the pupils in my class like each other,” and “children in our class like each other as friends.” Friction in the classroom, or the extent of tension and conflict in the learning environment, is measured on the MCI-SF with statements including, “children are always fighting with each other,” and “some of the children in our class are mean” (Sink & Spencer, 2007).

Recent research shows a negative linear relationship between classroom cohesion and friction and classroom climate (Kearney, 2013). A study of fourth- and fifth-grade students showed that students who reported positive relationships with their teachers also reported higher levels of school satisfaction (McMahon, Wernsman, & Rose, 2010). Similarly, Riley (2009) found that teachers who applied effective classroom management systems had more positive relationships with their students. German researchers examined saliva samples to measure the levels of cortisol when students were asked to discuss relationships with their peers and teachers. Students showed higher levels of

stress when they described more friction in the classroom (Ahnert, Harwardt-Heinecke, Kappler, Eckstein-Madry, & Milatz, 2012).

**Satisfaction.** As children spend much of their time in school, attention should be given to their satisfaction with the classroom environment. Friendly, supportive, and classrooms free of harassment are perceived characteristics that contribute to student satisfaction (Luthar, Cicchetti & Becker, 2000). Sink and Spencer (2007), define satisfaction as the level to which students like their class. Statements included on the MCI-SF to measures student satisfaction include “the students enjoy their schoolwork in my class,” and “the class is fun.”

Preliminary data from a longitudinal study show that clear rules and a predictable structure (as addressed by the Color Wheel System) positively influence satisfaction in elementary school students. Such techniques not only contribute to student satisfaction but provide students with a greater opportunity to master curriculum (Baker, Terry, Bridger, & Windon, 1997).

**Competitiveness.** Classroom competitiveness can also impact the students’ learning environment. Sink and Spencer (2007) refer to competitiveness as the level of perceived classroom rivalry. Majeed, Fraser, and Aldridge (2002) found that secondary students in India identified competition as a major hindrance to their satisfaction with the classroom. Additional studies show that students, especially elementary students, prefer collaborative learning environments over competitive learning environments (Ellison, Boykin, Tyler, & Dillihunt, 2005).

## **Research Questions**

The purpose of this study is to empirically validate a classroom management system for kindergarten students. Specifically, a multiple baseline across-classroom design was used to evaluate the effects of the Color Wheel System on kindergarten students' out-of-seat behavior and inappropriate vocalizations. In addition, pre-and post-test evaluations will evaluate students' perceptions of the classroom climate. Previous researchers have shown that the Color Wheel System is an effective classroom management technique for decreasing students' out-of-seat behavior (Blondin et al., 2012; Fudge et al., 2008). Others have shown that the Color Wheel System can decrease inappropriate vocalization in first- and third-grade classrooms (Kirk et al., 2010). While evidence suggests that the Color Wheel System may be effective with kindergarten students, no scientific procedures have been applied to evaluate the management system in kindergarten classrooms. Also, no literature exists evaluating the effects of the Color Wheel System on perceived classroom climate for kindergarten students. The current study will address these limitations by applying the Color Wheel System to multiple kindergarten classrooms and administering measure of classroom climate to students.

## Chapter II

### **Method**

#### **Participants and Setting**

Procedures were implemented in three rural kindergarten elementary school classrooms. The school had approximately 540 students in grades K-5 and 36 teachers. The school, located in the Southeastern U.S., included approximately 91% Caucasian students, 5% Hispanic students, 4% African American students, and 1% of students from other ethnic backgrounds. Approximately 41% of the students enrolled in the school qualified for free or reduced-price lunch. Participants included three female general education teachers and 50 students in three general education kindergarten classrooms. All students were five or six years old. No students had been retained. As all English Language Learners (ELL) in kindergarten were served in one classroom, and schedule conflicts (these students attended the English as a Second Language school during the morning instruction time) prevented targeting this classroom, the participant pool included no ELL students. The participating teachers had no previous training with the Color Wheel System and all consented to employ the new management system.

Classroom A contained four tables with four to five chairs at each for 17 students. The class was made up of 8 girls and 9 boys (15 Caucasian, 1 Asian, and 1 African-American student). No students were retained from the previous year and no students were identified as having a disability. A kidney-shaped table was located in the back of the room for small group instruction. An additional round table was located near the teacher's desk at the front of the room. This table was used by the teacher's assistant for

progress monitoring and occasional small-group instruction. The teacher's rocking chair was positioned beside the teacher's desk at the front of the room. She would often sit in this chair during large-group instruction. A small play area was located by the teacher's office door. This was primarily used on rainy days when recess time was restricted to indoor play.

Classroom B contained four tables with four to five chairs at each for 16 students. The class was made up of 9 girls and 7 boys (15 Caucasian and 1 African-American student). No students were retained from the previous year and no students were identified as having a disability. A kidney-shaped table was located in the back corner of the room for small group instruction. Four computers lined the wall near the teacher's desk. Students used the computers as one of their centers, often playing word bingo or math games. A rocking chair was positioned at the front of the room for large-group instruction.

Classroom C contained four tables with four to five chairs at each for 17 students. The class was made up of 8 girls and 9 boys (16 Caucasian and 1 Africa-American student.) No students were retained from the previous year and no students were identified as having a disability. A kidney-shaped table was located near the entry door for small-group instruction. A rocking chair was positioned at the front of the room for large-group instruction. A small play area was located in the front corner of the room. This was primarily used on rainy days when recess time was restricted to indoor play.

## **Color Wheel System Development and Materials**

In order to solicit participants, the primary experimenter provided a brief description of Color Wheel System procedures approximately eight months before procedures were applied. The teachers indicated one problem with standard Color Wheel System procedures, that their expectation for students to be seated varied dependent upon activities. Consequently, seat-in-seat was altered to correctly seated in area to accommodate various instructional spaces (e.g., on the carpet or seated at tables).

The primary investigator prepared three sets of poster board. Each set included a red, green, and yellow poster board with corresponding rules printed on each in large black print. The primary experimenter also constructed three color wheels using two circles with 12-inch radii cut from white poster board. One circle had a pie-shaped wedge, approximately  $\frac{1}{3}$  of the circle, cut out. The second circle was covered with red, yellow, and green paper, each color covering  $\frac{1}{3}$  of the circle. Next, the experimenter used a tack to attach the white circle with the cut out wedge to the top of the tri-colored circle. This allowed the top circle to be rotated to reveal one of the three colored wedges (red, green, or yellow) of the circle underneath. Only one color could be viewed at any given time.

## **Research Design and Independent Variable**

A multiple baseline across classroom design was used to evaluate the effects of the independent variable, the Color Wheel System. The Color Wheel System (Color Wheel System ) is a class-wide prevention technique that has improved classroom behaviors by establishing clear antecedent stimuli (Blondin et al., 2012; Fudge et al.,

2007; Fudge et al., 2008; Kirk et al., 2010; Skinner & Skinner, 2007). For each classroom, baseline data were collected under typical classroom management procedures. The Color Wheel System was then applied in a staggered fashion across classrooms.

### **Dependent Variables**

**Primary dependent variable: Inappropriate vocalizations.** Based on visual analysis of baseline data (trend and level), we chose inappropriate vocalizations as our primary dependent variable. Inappropriate vocalization was defined as any comment or vocal noise that was not solicited by the teacher (e.g., calling out an answer when student should have raised hand, clicking tongues, whistling).

During typical classroom management (TCM) and intervention phases, direct observation data were collected on students' inappropriate. Inappropriate vocalizations were recorded class-wide using partial-interval recording. Data were analyzed using visual analysis of time-series graphs and statistical analysis of effect size. Data analysis and collection procedures are described in more detail in the corresponding sections.

**Secondary dependent variable: Out-of-seat behavior.** Out-of-Seat behavior served as our secondary dependent variable. Operational definitions for out-of-seat behavior varied for different instructional locations. For seat work, in-seat behavior was defined as any part of students' body from waist to thighs touching the chair. If a child did not meet this criterion, his or her behavior was scored as out-of-seat. Students sitting on his or her knees or standing beside his or her chair with one knee on their seat were scored out-of-seat. During instructional time spent on the carpet, teachers preferred their students to sit with their legs crossed (e.g., criss-cross applesauce or Indian style).

Therefore, any student not sitting with his or her buttocks on the carpet and legs crossed was scored as out-of-seat. Students sitting with one leg tucked under their body or with legs extended out straight were scored out-of-seat.

During typical classroom management (TCM) and intervention phases, direct observation data were collected on students' out-of-seat behavior. Out-of-seat behavior was recorded class-wide using momentary time-sampling recording. Data were analyzed using visual analysis of time-series graphs and statistical analysis of effect size.

Direct observation data were collected four to five times per week for 20-minute interval sessions (see Table 1 for schedule of procedures). One to two independent observers quietly entered the classroom, took a prescribed assigned chair in the back, and recorded data. The observer used a digital recorder to cue intervals every 10s and headphones to hear intervals. Momentary time sampling was used to record students' out-of-seat behavior. At the moment the recorder signaled an interval, the observer immediately recorded the number of students out-of-seat. For the remainder of the interval (every 10s), observers used partial-interval recording the occurrence of inappropriate vocalizations by marking a slash in the box corresponding to the interval.

**Other dependent variable: Perception of classroom climate.** Students completed baseline and post-intervention phase forms designed to measure their perceptions of classroom climate. The primary researcher individually administered a modified version of the My Class Inventory-Short Form (see Appendix A) to each student who provided parental consent and assented to answer questions. We modified the measure by altering items to enhance the probability of kindergarten students

understanding each item. Additionally, the primary researcher read each item to students. After items were read aloud, students responded verbally with a "yes" or "no". The researcher then recorded the students' responses on the survey. Students responded to survey items twice, once during typical classroom management procedures and once during Color Wheel System.

These classroom climate data were not used to draw cause and effect conclusion, but to provide initial exploratory evidence for the MCI-SF in kindergarten classrooms. In fact, there are at least several reasons why these data should not be used to draw firm conclusions. Although there is some psychometric support for the measure, because the researchers modified items and administration (e.g., read aloud to students) there is not data to support the validity and reliability of the classroom climate data. Because the MCI-SF has not been normed with students under second grade, results should be interpreted with caution. Many kindergarten students may not be developmentally advanced enough to accurately respond to some items on the measure. As the measure was only administered to those students whose parents returned an informed consent (see Appendix K), classroom climate data was only collected on a select number of students. Additionally, because we did not employ a control group, we cannot assume that any changes were caused by the application of the Color Wheel System. Despite these limitations, this measure may have heuristic value in that it may provide direction for future research on the possible effects of implementing the Color Wheel System on broader classroom factors.

## **Analyses**

The primary dependent variable, inappropriate vocalizations, was calculated for each session by summing the total number of intervals in which inappropriate vocalizations occurred and dividing by the total number of intervals observed and multiplying the ratio by 100. The secondary dependent variable, out-of-seat behavior, was calculated by summing the number of students out-of-seat for each interval and dividing by the total number of students in the classroom. An average score across all intervals was then calculated. This total proportion was then multiplied by 100. Time series graphs were constructed for each variable. Visual analysis was used to interpret these graphed data by examining changes in immediacy, level, and trend across phases. For each classroom, within-phase mean and standard deviation data were used to calculate effect sizes across adjacent phases (Fudge, et al., 2008). Pre- and post-test classroom climate data were analyzed using descriptive summaries and t-tests.

## **Procedures**

There were four phases of the current study, baseline (TCM), teacher and student training, Color Wheel System intervention, and maintenance (see Table 1). Phase data were collected for 20 minutes in each of three classrooms from about 7:50AM to 9:00AM each morning. This 20-min period was selected for the following reasons: (1) group instruction occurred during this time every morning (2) it did not conflict with the students' special classes (e.g., gym, library, music, art, technology, guidance), (3) this time frame did not conflict with the researchers' other commitments, (4) students typically experienced fewer transitions after lunch.

**Baseline phase procedures.** Before collecting direct observation data, the primary researcher administered the modified MCI-SF to all students whose parent had returned an informed consent letter. Each student was assigned a research number that was used on each survey. The researcher called each student to a quiet corner of the classroom to administer the survey. The primary researcher began by explaining that she was trying to learn more about the student's class and then asked the student if he or she would answer a few questions about his or her classroom. The researcher then instructed the students to say "yes" if the statement was true and "no" if the statement was not true. All twenty items were read aloud to the students. Each student indicated his or her agreement to the item by stating "yes" or "no" and the researcher circled the students' answer on a hardcopy of the survey.

During baseline, each teacher used typical classroom management procedures. The primary researcher entered each classroom and sat in the corner of the room. A data collection sheet (see Appendix B) adapted from the *State-Event Classroom Observation System* (Saudargas & Creed, 1980) was used to record the instance of inappropriate vocalizations and out-of-seat behavior. The primary researcher used an Ipad® and headphones for time keeping. Every 10 seconds for a total of 20 minutes, the Ipad® beeped. At the time of the beep, the researcher recorded the number of students out-of-seat at that given moment. For the remainder of the interval, the researcher scored the interval with a slash if any inappropriate verbalization was made by a student in the classroom.

**Teacher and student training phase.** While the color wheel appears quite simple, it is important for teachers to be trained thoroughly to maximize implementation integrity (Skinner, et al., 2007). Before the Color Wheel System was implemented in each classroom, the primary researcher trained each teacher on the procedures and rules of the Color Wheel. Likewise, students were trained on color wheel procedures when first applied.

Teachers were trained in their classrooms when students were not present using implementation guidelines described by Skinner et al. (2007). Training procedures included demonstration, role-playing, immediate feedback, discussion, and practice.

Each teacher was trained using the same general procedures. Teachers were instructed to post the color wheel and classroom rules in a visible location at the front of the room where group instruction was generally delivered. The color wheel and rules were posted when students were not present. The researcher then presented the Color Wheel System and described how and when to move from one set of rules to the next set of rules. Teachers were reminded to use yellow for instructional activities and green for free time or as a classwide reward for good behavior. The primary researcher then demonstrated the transition procedures and provided additional explanations if needed. Next, teachers practiced the Color Wheel System procedures in the presence of the primary researcher who provided immediate feedback on implementation. Specifically, teachers practiced giving the timed warnings for when the color wheel would go to Red (e.g., the color wheel will change to red in 2-min). They also practiced moving from Red to Yellow and Red to Green. In these instances, no time warning was needed. Likewise,

the primary researcher reminded teachers to move to Red for each transition in order to set the stage for the next activity. Teachers were reminded that the color wheel should never move from Yellow to Green or Green to Yellow.

The researcher explained that the goal of the Color Wheel System is to provide students with opportunities for success. Thus, the time spent on Red rules, the most difficult to follow, should be brief. The researcher explained that the Red rules should never be used for punishment, but primarily for transitioning from one activity to another. Teachers were reminded to only answer student questions after the color wheel was moved to Yellow as students are not allowed to talk on Red. The teachers were encouraged to use statements such as “great job” and “You are doing an excellent job following Yellow rules!” to acknowledge students’ rule following behavior. Each teacher was encouraged to prompt those who were not following the rules (e.g., motioning students to put their hands down). The color wheel and corresponding rules were removed from the classroom after each practice session. Each teacher was provided a description of color wheel procedures and a rationale for those procedures.

The first days of implementation were considered practice days for both teachers and students. During the first two days of implementation, data were not collected on classwide behavior. Rather, the primary researcher observed the integrity of teacher implementation of Color Wheel System procedures. After observing teachers, the researcher provided feedback regarding any mistakes in procedures.

During training for Teacher A, the researcher and teacher both practiced the Color Wheel System in the role of student and teacher. Specifically, they practice transitioning

from one activity to another (morning seat work to carpet). On the first day of implementation in Classroom A, color wheel rules were posted before students entered the classroom. The teacher began the day by reading the provided script (see Appendix C) that described the procedures. Students were also informed of the goals of the color wheel (e.g., to make classroom rules very clear).

Teacher A described and modeled each rule. First, Teacher A explained each specific rule. She also modeled what rule-following looked like by demonstrating certain behaviors addressed in the rules (e.g., raising hand, how to sit when the wheel is on red, and what quiet voices should sound like). Next, she briefly described the rationale for each rule. For example, the teacher explained, “Yellow rules will make it easier for you to learn and do your work without interruptions.”

After introducing each rule, students read, re-read, and repeated rules numerous times throughout the day. Skinner et al. (2007) suggest practicing rules in a fun way. Thus, Teacher A asked students to recite Red rules while the wheel was on each color. Several students raised their hands to provide rules when the color wheel was on Red. The teacher instructed students to put their hands down reminding all that there is no hand-raising on Red. Next, the teacher moved the color wheel to Yellow, asked the same question, and called on a student who raised his hand. Teacher A taught and re-taught the rules and procedures for the first few days of implementation. She was instructed not to provide strong consequences for mistakes during these days as students need to become acclimated to the new system.

No data were collected on the first day of implementation. The researcher was present only to observe the integrity of implementation. The researcher spent approximately two hours in the classroom observing students and the teacher. Each time Teacher A turned the color wheel to a different color, she had student repeat the rules and called on students to demonstrate rule-following. She frequently praised students for correctly following rules and provided gentle reminders to students not following color wheel rules. During this time, the researcher noted several deviations from Color Wheel System procedures. First, Teacher A did not consistently provide a 2-min warning before turning the color wheel to red. Second, in one instance, Teacher A was observed turning the color wheel from yellow to green without first returning to red. During the teacher's plan period, the researcher discussed these deviations with the teacher and reminded her to provide the warning and to always turn the color wheel to red before moving it to yellow or green.

As with training for Teacher A, the researcher and Teacher B both practiced the Color Wheel System in the role of student and teacher. For Teacher B, training focused on transitioning from writing activities at student desks to story time on the carpet. On the first day of implementation in Classroom B, color wheel rules were also posted before students entered the classroom. The teacher started the day by reading the provided script that described the procedures and of the goals of the color wheel (e.g., to make classroom rules very clear). After reading the script (see Appendix C), Teacher B had students repeat each rule. Next, she described each rule and called on students to explain

how to follow each rule. To end the introduction, Teacher B asked students why it is important to follow each rule in the classroom.

The researcher spent approximately two hours in Classroom B on the first day of implementation. Similarly to Teacher A, each time Teacher B turned the color wheel to a different color, she had student repeat the rules and called on students to demonstrate rule-following. She provided gentle reminders to students not following color wheel rules. During this time, the researcher noted few deviations from Color Wheel System procedures. Teacher B did not provide a 2-min warning during one transition. During the teacher's plan period, the researcher discussed deviations with the teacher and reminded her to frequently praise students for following color wheel rules.

For Teacher C, training focused on transitioning from writing instruction on the carpet (using whiteboards) to independent seat-work. On the first day of implementation in Classroom C, the color wheel was posted before students entered the classroom. The teacher began by reading the script (see Appendix C) that described the procedures of the color wheel. After reading the script, Teacher C had students repeat each rule and called on individual students to demonstrate rules. To end the introduction, Teacher C encouraged student to look at the Color Wheel before raising their hands to ask questions.

The researcher spent approximately two and a half hours in Classroom C on the first day of implementation. Similarly, to the other teachers, each time Teacher C turned the color wheel to a different color, she had student repeat the rules and called on students to demonstrate rule-following. During this time, the researcher noted few deviations from Color Wheel System procedures. Teacher C did not have the Color

Wheel rules posted in her classroom and forgot to use the wheel during one transition. During the teacher's plan period, the researcher offered to help hang the rules in a visible location near the Color Wheel. The teacher realized she forgot to use the Color Wheel for one transition and reviewed the procedures again with the researcher.

**Intervention phase.** After allowing teachers and students a few days to adjust to the Color Wheel System procedures, direct observation data were collected. When approaching the end of a classroom activity, students were given two warnings by their teacher. The first was a 2-min warning (e.g., "The color wheel is changing to red in 2 minutes". The second was a 30-second warning (e.g., "The color wheel is changing to red in 30-seconds) (Kern & Clemens, 2007; Skinner et al., 2007). After the indicated time had elapsed, the teacher turned the color wheel to red. The teacher then faced the students and quickly communicated instructions for the next activity. During this time, if following red procedures, students were sitting quietly in their spot (at their desk or on the carpet), were looking at the teacher, and were not talking or raising their hands to speak. Because the red rules are the most difficult to follow, time on red was kept brief. The longer the time spent on red, the more likely students were to break the red rules. Time on red included the teacher explaining procedures for the next activity (e.g., instructing students to move to their centers when the color wheel changed to yellow) and praising students for following red rules. The teacher then turned the color wheel to yellow or green. During time on yellow, students could raise their hand to ask questions or make requests (e.g., bathroom break or additional materials). Yellow was used for most instructional activities such as story time or independent seat work. The teacher

could choose to turn the wheel to green for recreational times such as indoor recess. When the wheel was on green, students were permitted to talk quietly to their neighbors. Teachers were encouraged to use time on green as a reward for rule-following as well.

Treatment was applied in Classroom A on the sixth day of data collection, in Classroom B on the ninth day, and in Classroom C on the twelfth day of data collection. While the teacher implemented the Color Wheel System all day, data were only collected during 20-minute segments four to five mornings per week. This 20-min period was selected for the following reasons: (a) group instruction occurred during this time every morning, (b) it did not conflict with the students' special classes (e.g., gym, library, music, art, technology, guidance), (c) this time frame did not conflict with the researchers' other commitments, (d) students typically do not participate in as many structured activities after lunch.

Visual analysis time series graphs were used to determine when the Color Wheel System would be implemented in each classroom. Intervention application was selected based on trend, level, and variability of baseline data for the primary dependent variable (inappropriate vocalizations). While each classroom displayed an increasing trend during the first five observations sessions, we chose the first classroom due to the high rates of inappropriate vocalizations. Additionally, the teacher expressed her growing frustration with disruptive behaviors in her classroom and she requested the intervention. While the remaining classrooms displayed an increasing trend across the first eight days of observation, we chose the second classroom because there was less variability in the data.

Color Wheel System procedures were implemented in classroom A after collecting five days of baseline data, classroom B after eight days, and classroom C after ten days.

**Maintenance phase procedures.** Weekly maintenance phase data were collected for three weeks following the intervention phase. Data were collected using the same techniques used for intervention data, partial-interval recording for inappropriate vocalizations and momentary time sampling for out-of-seat behavior. Classwide inappropriate vocalizations and out-of-seat behavior were calculated and graphed with baseline and intervention phase data. A second observer collected data on one day during maintenance phase. Additionally, integrity data were collected across maintenance phase observation sessions.

Student perceptions of classroom climate were evaluated using the MCI-SF. Fraser (1982) and Fraser and Fisher (1983) reported internal consistency reliability for the shorter MCI versions as follows: Satisfaction, .78; Friction: .71; Competitiveness: .71; Difficulty: .65, and Cohesiveness: .67. Fraser and O'Brien (1985) reported the following coefficients for an Australian sample of third-grade students: Satisfaction, .68; Friction, .78, Competitiveness, .70, Difficulty, .58, and Cohesiveness, .81). Using a sample of seventh-grade students in Australia, Byrne, Hattie, and Fraser (1986) found alpha coefficients ranging from .84 to .93 on each of the scales. Concurrent validity comparing the long form of the MCI to the MCI-SF ranged from .91 to .97, which is considered strong. Discriminant validity was measured by correlating the MCI-SF to other school climate subscales on the Individualized Classroom Environment Questionnaire and the Classroom Environment scale. Mean correlations on scales

measuring Difficulty and Friction were .13 and .30 respectively. For the current study, we chose a revised version of the MCI-SF which is a 20-item scale excluding the original Difficulty scale. The primary researcher individually administered the 20-item instrument to each student who returned an informed consent.

### **Interobserver Agreement**

During baseline, intervention, and maintenance phases, the primary researcher sat in the back of the room, used an Ipad® to signal each interval, and recorded direct observation data on the data collection form. Two researchers collected data simultaneously on 20% during baseline sessions, 25% during intervention sessions, and 33% during maintenance sessions). The two researchers followed the same procedures for recording class-wide behavior. During interobserver sessions, the second researcher sat next to the primary researcher, using a different earpiece to listen to the same Ipad® cues. The two observers sat an angle in which they could not see each other's data collection sheets. Interobserver agreement for inappropriate vocalizations was calculated by summing the total number of agreements on each interval (either presence or absence of inappropriate vocalizations) and dividing by the number of agreements plus disagreements, and then multiplying by 100. Percent interobserver agreement ranged from 78.1% to 100% ( $M=92.1$ ).

Interobserver agreement for momentary time sampling was examined by calculating the total number of intervals with perfect agreement and intervals agreed 100% with a difference of one (partial agreement). Results showed that perfect agreement ranged from 28.3% to 97.5% ( $M = 62.9\%$ ) of intervals. Perfect agreement

combined with intervals that only differed by one student, ranged from 65.8% to 100% ( $M = 93.5\%$ ). Because out-of-seat behavior was collected using interval data, we also calculated Pearson's  $r$  for further analysis of interobserver agreement. Correlations were only calculated for the secondary dependent variable. Pearson's  $r$  ranged from .51 to .94 between observers across phases in Classroom A, .81 to .99 in Classroom B, and -.19 to .98 in Classroom C. All were significant at the .01 level except Pearson's  $r$  for baseline data in Classroom C, which was significant at the .05 level.

**Treatment integrity and acceptability.** During each treatment and maintenance phase observation session, the primary observer also used an adapted eight-step checklist developed by Fudge et al. (2008) (see Appendix D) to evaluate treatment integrity. If any deviations from the checklist were noted, direct feedback was provided following the session by the primary researcher. We collected integrity data on Teacher A for 15 days. Teacher A correctly implemented 100% of the steps during four sessions. She implemented seven out of eight steps correctly (88% accuracy) during eight sessions. On those eight days, she did not deliver a 2- minute warning before turning the color wheel to red. On two days, Teacher A correctly implemented six out of eight steps (75% accuracy). On both days, Teacher A did not deliver a 2-min or 30-second warning before moving the color wheel to Red. On one day, Teacher A implemented five of eight steps correctly (63% accuracy). This was the only day Teacher A failed to use the color wheel for a transition. On this day, she did not give either warning or turn the color wheel to red.

We collected integrity data on Teacher B on 12 days. Teacher B correctly implemented 100% of the steps correctly during 10 sessions. Teacher B forgot to give a 2-min warning during one session, implementing seven of eight steps correctly (88% accuracy). She correctly implemented five of eight steps (63% accuracy) on the final day of maintenance data collection. This was the only instance Teacher B did not use the color wheel for a transition. She did not provide a 2-min or 30-second warning or turn the color wheel to red.

Across nine days, Teacher C correctly implemented 100% of the steps during four sessions. These 4 days were the first 4 days of implementation. On two days, Teacher C did not deliver a 2-min warning, correctly implementing seven of eight steps (88% accuracy). There were three additional days in which Teacher C failed to deliver either warning (i.e., 2-min or 30-second) before changing the wheel to red (75% accuracy). We did not observe a transition in which Teacher C failed to use the color wheel.

A second researcher observed the sessions one day during each treatment phase. This observer also completed an integrity checklist for each teacher. Raters agreed 100% on teacher integrity across four interobserver days.

To evaluate teacher acceptability, after the last session of data collection, each teacher completed a 10-item six-point Likert-type scale (see Appendix E). The scale ranged from 1(*Strongly Disagree*) to 6(*Strongly Agree*). This scale was adapted from an acceptability measure developed by Fudge et al. (2008).

## Chapter III

### Results

#### Inappropriate Vocalizations

**Visual analysis of time series graphs.** Across all phases, partial-interval and momentary time-sampling data were collected for each classroom. Baseline data were collected for 5 days in Classroom A, 8 days in Classroom B, and 10 days in Classroom C (see Table 1). Partial-interval recording data were used to calculate the primary dependent variable, inappropriate vocalizations.

Figure 1 depicts a time-series graph that displays the percent of intervals scored for inappropriate vocalizations across phases and classrooms. For each classroom, visual analysis of Figure 1 displays no clear trend during the baseline phase with inappropriate vocalizations occurring between 77%-99% ( $M = 88.0$ ,  $SD = 9.7$ ) of the observation session in Classroom A, 75%-98% ( $M = 88.3$ ,  $SD = 8.5$ ) in Classroom B, and 73%-96% ( $M = 82.8$ ,  $SD = 12.0$ ) in Classroom C. Immediately after the Color Wheel System was implemented in Classroom A, on the sixth experimental day, inappropriate vocalizations decreased and remained lower than any baseline session ranging from 38%-57% ( $M = 45.2$ ,  $SD = 6.8$ ). Similar results were observed in Classroom B with inappropriate vocalizations again decreasing and remaining lower than baseline sessions. Inappropriate vocalizations during Color Wheel System implementation in Classroom B ranged from 10%-43% ( $M = 20.8$ ,  $SD = 11.1$ ). After Color Wheel System implementation in Classroom C, inappropriate vocalizations also decreased and remained lower than baseline sessions ( $M = 23.5$ ,  $SD = 7.5$ ; range 13.3% - 35.0%). Figure 1 shows no

overlapping data points across baseline and intervention phases. Thus, for each session, inappropriate vocalizations were always lower during intervention procedures than during baseline phases.

Color Wheel System was implemented in Classroom A after a series of school cancellations due to weather. On the first day of implementation, there was a decrease in inappropriate vocalizations across classrooms. Throughout the remainder of the phase, inappropriate vocalizations remained low in Classroom A and increased to previous baseline levels in classrooms B and C. Further across-series comparisons show no other concomitant decreases in inappropriate vocalizations across classrooms.

**Statistical analysis of classwide inappropriate vocalizations.** In addition to visual analysis of Figure 1, statistical analysis was also used to calculate effect sizes (ES) for inappropriate vocalizations across adjacent phases in each classroom. Effect size estimates were calculated using Cohen's *d* (Cohen, 1988). There were large effect sizes between baseline and intervention phases in each classroom for inappropriate vocalizations (see Table 2). In classroom A, from baseline phase to intervention phase we obtained an effect size (ES1) estimate of 5.1. An effect size of 6.9 was calculated in Classroom B from baseline to intervention phase. Finally, effect size between baseline and intervention phase in Classroom C was 6.0. In addition, large effect sizes estimates were calculated from baseline to maintenance phases (ES2) across classrooms (see Table 2). Large effect sizes were calculated in Classrooms A and C from intervention to maintenance phases, suggesting a continued decrease in inappropriate vocalizations through maintenance phases. Small effect sizes were calculated in Classroom B from

intervention to maintenance phases, suggesting that the intervention continued to be effective through the maintenance phase. Overall, these data show large (according to Cohen, 1988) decreases in inappropriate vocalizations when the intervention was implemented across each classroom.

Due to a small number of data points in each phase, effect size for inappropriate vocalizations was also calculated using Hedges' *g* (Hedges, 1981). Hedges' *g* was calculated by comparing the difference in means of adjacent phases divided by the average, pooled standard deviations corresponding to the two means. There were large effect sizes between each phase in each classroom. From baseline to intervention in Classrooms A, B, and C, we obtained effect sizes of 5.26, 6.45, and 5.30 respectively (see Table 2). From baseline to maintenance in Classrooms A, B, and C, calculated effect sizes were 5.2, 5.9, and 5.65 respectively (see Table 2).

### **Out-of-Seat Behavior**

**Visual analysis of time series graphs.** Momentary time-sampling data were used to calculate the secondary dependent variable of class-average out-of-seat behavior for each session. Figure 2 depicts a time-series graph that displays the average proportion of students out-of-seat at a given moment. Visual analysis of Figure 2 displays an increasing trend during the baseline phase in Classroom A with approximately 5%-20% ( $M = 11.9$ ,  $SD = 6.7$ ) of students out of their seats at a given moment. No clear trend was observed for Classrooms B and C. Classroom B out-of-seat behavior ranged from 8%-35% ( $M = 18.5$ ,  $SD = 10.4$ ) during baseline phases. Finally,

over 11 days, baseline out-of-seat behavior for Classroom C ranged from 8%-25% ( $M = 14.1$ ,  $SD = 5.6$ ) of students at a given moment in time.

Immediately after the Color Wheel intervention was implemented in Classroom A, out-of-seat behavior decreased and remained relatively stable during intervention sessions ranging from 4%-12% ( $M = 7.1$ ,  $SD = 2.6$ ). While the proportion of students out-of-seat decreased immediately, there were several overlapping data points. Similar results for out-of-seat behavior were observed in Classroom B. Immediately after the Color Wheel intervention was implemented in Classroom B, out-of-seat behavior decreased steadily during the first four days of implementation. However, out-of-seat behavior began to rise on day 5 and increased until a large drop on day 16. Out-of-seat behavior in Classroom B ranged from 2%-15% ( $M = 8.7$ ,  $SD = 4.6$ ) during Color Wheel System phase. After Color Wheel System implementation in Classroom C, out-of-seat behavior decreased immediately with less than 1% of students being out-of-seat. While out-of-seat behavior increased after the first day of implementation, it did remain lower than baseline on almost every day of implementation (1%-9%;  $M = 5.9$ ,  $SD = 2.8$ ).

As with inappropriate vocalizations, out-of-seat behavior decreased across classrooms during the first day of Color Wheel System implementation in Classroom A but immediately increased in classrooms B and C. On the first day of implementation in Classroom B, there was a slight decrease in out-of-seat behavior in Classroom C but an immediate increase on the second day. Implementation in Classroom C occurred after spring break. On the first day of implementation in Classroom C, there was a decrease in out-of-seat behavior across classrooms.

**Statistical analysis of classwide out-of-seat behavior.** Despite several overlapping data points, there were large effect sizes between phases for out-of-seat behavior in all three classrooms (see Table 3). Effect sizes were calculated using Cohen's *d* (Cohen, 1988). Effect size for out-of-seat behavior in Classroom A was 1.0 baseline to intervention. Effect size for out-of-seat behavior in Classroom B was 1.2 baseline to intervention. The largest effect size of 1.9 for out-of-seat behavior was calculated in Classroom C from baseline to intervention. Large effect sizes were also calculated in each classroom from baseline to maintenance phases (see Table 3). These data show large changes in out-of-seat behavior after intervention was implemented and also show continued effects several weeks after implementation. Effect sizes were calculated using Hedges' *g* (Hedges, 1981). Analyses show large effect sizes from baseline to intervention phases for out-of-seat behavior in Classrooms A, B, and C of 1.1, 1.2, and 1.6 respectively. A medium effect size (0.7) was calculated using Hedges' *g* for Classroom A baseline to maintenance phase. From baseline to maintenance phases in Classrooms B and C, large effect sizes of 0.9 and 1.2 were calculated. Small effect sizes were calculated from baseline to maintenance phases, suggesting the intervention continued to be effective through maintenance phases.

### **Classroom Climate Survey Data Analysis**

Pre-and Posttest measures of classroom climate were analyzed using paired-samples *t*-tests. Results of the *t*-tests are displayed in Table 4. The dependent *t*-test revealed no significant difference between pretest and posttest scores for the entire sample,  $t(25) = .834, ns$ . The mean pretest score was 43.25, the mean posttest score was 42.5.

The standard deviation of the pretest to posttest gain score was 4.8. Students overall did not score significantly higher on measures of classroom climate after the Color Wheel System was implemented.

### **Teacher Acceptability**

All three teachers were given acceptability forms (see Appendix E) to complete after the study. All teachers rated each item 6, strongly agree. These data suggest all teachers found the Color Wheel System highly acceptable.

Each teacher was also asked to take part in a semi-structured teacher acceptability interview (see Appendix F). In the teacher acceptability interview, Teacher A reported that the Color Wheel System was effective in her classroom. She reported improvement in student behavior as well as her own behavior. She noticed her students remaining in their seats more often than before Color Wheel System implementation. In terms of her own behavior, she noted that the Color Wheel System helped her move through classroom activities more smoothly and save time during transitions. When asked to indicate any negative aspects of the Color Wheel System, she stated that it took several days to get her students back on track with the Color Wheel System procedures after days missed for weather and spring break. She reported that several of her students had difficulty staying awake when they first came to class. She said it was sometimes difficult for these students to follow the Color Wheel System rules or participate in morning activities. Teacher A reported that she believed the Color Wheel System worked well for most classroom activities; however, she noted that she would like to add a different set of procedures for arrival times and times when student could read with a

partner. She also indicated that her class could benefit from a portable visual prompt for hallway. She believed the Color Wheel System was worth the time and effort spent implementing the procedures and plans to use the system with future classes.

During the acceptability interview, Teacher B indicated that the Color Wheel System was effective in her classroom. After implementing the Color Wheel System in her classroom, she noticed an improvement in her students' behavior when a guest entered the room or when her classroom phone rang. She indicated that the Color Wheel System helped her reduce the amount of side conversations that usually occurred with students during transitions. The teacher noted that her students took to the new procedures very well and even described the new procedures to their parents at home. One parent, who was also a school teacher, contacted Teacher B to inquire about the Color Wheel System. Teacher B indicated that, with such a dynamic classroom, it was sometimes inconvenient to walk to the wheel to change the color. She also commented that the wheel was too big and that she would probably reduce the size of the wheel for the following school year. She indicated that she would not change anything with the procedures for her current group of students. Teacher B also reported that the Color Wheel System was worth the time and effort applied and believed she would use the system again with future students.

During the acceptability interview, Teacher C also indicated that the Color Wheel System was effective in her classroom. In addition to fewer inappropriate vocalizations and fewer students leaving their seats, she noticed her students looking to each other more to model appropriate behavior. Teacher C revealed that she typically ran her

classroom with a looser structure than the other teachers. Specifically, she usually allows students to call out answers rather than raising their hands. She noted that the Color Wheel System helped her to encourage more hand-raising in her classroom. She believed this would benefit her students in preparing them for first grade. She also indicated that the Color Wheel System made expectations very clear to students, which reduced the number of times she had to repeat instructions. When asked about negative side effects or things she did not like about the Color Wheel System, she reported that it was difficult for her not to view red as negative. She believed this to be a result of using classwide management systems in which red represented loss of privileges. Like the other teachers, Teacher C believed the Color Wheel System to be worth the time and effort and plans to use it with her future classes.

## Chapter IV

### **Discussion**

The current study was designed to empirically validate a classroom management system for kindergarten students. A multiple baseline across classrooms design was used to evaluate the effects of the Color Wheel System on kindergarten students' inappropriate vocalizations, out-of-seat behavior, and perceptions of the classroom climate. The current study suggests that applying the Color Wheel System decreased inappropriate vocalizations and out-of-seat behavior in three kindergarten classrooms. While there was no significant change in perception of classroom across classrooms as a result of the Color Wheel System, findings of the current study suggest that the Color Wheel System is an effective management system. Current results are consistent with previous research that suggests student behavior improves when the Color Wheel System is applied (Blondin, et al., 2012; Fudge, et al., 2007; Fudge, et al., 2008). We expanded past research by successfully implementing the procedures across three kindergarten classrooms. Likewise, we expanded the research on teacher acceptability of the Color Wheel System, which is important in developing an effective classwide management system.

Integrity data revealed that the color wheel procedures worked even when teachers did not implement them with perfect integrity. The majority of deviations from the implementation guidelines involved teachers not providing a 2-min warning before transitioning to a new activity. In the current study, each session involved observing students as they participated in activities on the carpet (e.g., calendar time, reading

instruction, and story-time). These activities involved little to no extraneous materials; therefore, providing a 2-min warning was pointless in that students did not need 2 minutes to transition to the next activity. On the other hand, students in an art class may require more than 2 minutes to put their materials away and to be ready to receive instructions for the next activity. This suggests that the 2-min warning can be easily adjusted by other procedures. This simple modification of procedures may make the Color Wheel System more ecologically valid. Despite several limitations, the current findings have theoretical and applied implications.

### **Limitations and Future Research**

Several limitations of the current study should be addressed by future researchers. Obvious limitations exist surrounding our secondary independent variable of out-of-seat behavior. Because it is difficult to collect consistent baseline data on two or more behaviors, we chose one behavior as the primary dependent variable. For the current study, we designated inappropriate vocalizations (inappropriate vocalizations) as our primary dependent variable. Consequently, decisions on when to change phases were based on inappropriate vocalizations; therefore, we relinquished all control over when to apply the intervention based on out-of-seat behavior trends. Despite some decreases in out-of-seat behavior and time constraints caused by weather delays, we applied the Color Wheel System intervention. Even though the trends were not always ideal for out-of-seat behavior in baseline, we still obtained strong effect sizes for decreasing out-of-seat behavior across classrooms.

We also recognize some limitations with our operational definition of out-of-seat behavior. Often, students were counted as out-of-seat but were not being disruptive (e.g., standing with one knee in chair or legs straight out when sitting on the carpet). Therefore, our out-of-seat behavior data may overestimate the amount of students out-of-seat in each classroom. Future researchers may want to establish a definition of out-of-seat behavior for younger students. An additional limitation of our study was our low interobserver agreement for out-of-seat behavior. Future researchers interested in out-of-seat behavior may want to use alternative data collection methods, such as partial-interval recording.

The Color Wheel System was implemented mid-way through the spring semester. At that point, kindergarten students were familiar with the classroom schedule, their teacher, and their classmates. This is a limitation to the study for several reasons. As most students in kindergarten are experiencing a structured classroom for the first time, there are likely more behavior concerns at the beginning of the school year. Despite this limitation in the current study, large effect sizes were still found for inappropriate vocalizations and out-of-seat behavior. The timing of implementation also may have had a large impact on the perception of classroom climate. As students had already been in school for several months, their perception of classroom climate may have already increased from the beginning of the school year. Future investigators may want to evaluate the effects of implementing the Color Wheel System on the first day of kindergarten.

As mentioned previously, there are several limitations with the measure of classroom climate used in the study. The measure is not normed with kindergarten

students. While certain items were modified to include simpler wording, the topics addressed may not be developmentally appropriate for five and six year olds. Additionally, some items in the survey were reverse-coded which could have caused some confusion to young students. Students in kindergarten may be more subject to “faking good” in that they will provide answers they think are favorable. A ceiling effect may exist with this measure in kindergarten students. It is likely that most students enjoy their classrooms in kindergarten as they are designed to be active and fun. Because of these limitations, the outcomes of our classroom climate measure may not be the best estimate of students’ perception of classroom climate. It may be helpful to develop a psychometrically sound self-report measure of classroom climate, without reverse-coded items, for early elementary students.

Some Color Wheel System researchers have evaluated the effect of the procedures on individual students (Blondin et al., 2012; Fudge et al., 2008). Data in this study were not collected in a manner that allowed for assessing behavior change in individual students. Because class average data were used in analyses, it is unclear whether the Color Wheel System improved the behavior of individual students. While inappropriate vocalizations and out-of-seat behavior improved in each classroom, we cannot evaluate whether the Color Wheel System was effective in reducing these behaviors in individual students who displayed more disruptive behaviors. Likewise, we did not evaluate the possibility that the Color Wheel System may have a negative effect on individual student behavior. Future researchers may consider collecting data on

students with below average, average, and above average behavior in addition to classwide data.

Previous researchers investigating the Color Wheel System have shown that the procedures are effective in increasing positive behaviors (e.g., on-task behavior) in students across grade levels in elementary school (Blondin et al., 2012; Fudge et al., 2008). While our findings do support the effectiveness of the Color Wheel System on reducing disruptive behavior (e.g., inappropriate vocalizations and out-of-seat behavior) they do not provide any insight into its effects on positive student behaviors. Future researchers may want to investigate changes in positive student behaviors such as on-task, in-seat, or hand-raising behaviors. In addition, researchers may evaluate how the Color Wheel System affects different populations of students. For example, students with attention issues may show an increase in on-task behavior due to Color Wheel System procedures reducing distractions in the classroom. Researchers may also want to validate the Color Wheel System in classrooms beyond elementary school (e.g., secondary school classrooms).

We recognize limitations regarding our teacher acceptability survey. Each teacher rated all items as *strongly agree*, which shows high acceptability. It is possible that teachers rated the intervention highly acceptable in order to please the researchers. To gain a more detailed explanation of teacher acceptability, we asked teachers to participate in a semi-structured acceptability interview. Each teacher interview provided directions for future research. Teacher A suggested adding a fourth set of rules for arrival and partner reading times. She also believed her students would benefit from a portable

Color Wheel to remind students of behavioral expectations outside the classroom. Teacher B stated that because she used many different areas of her classroom for instruction, it was sometimes inconvenient to walk to the color wheel for each transition. Future researcher could design a digital color wheel in which the teacher could manipulate with a remote control. Evidence of social validity also was obtained during this interview as Teacher B requested an additional color wheel and set of rules to share with her sister who taught kindergarten at a nearby school. Teacher C admitted that it was difficult not view Red as negative based on other classroom management techniques she had used in her classroom. Investigators may consider changing the colors of the color wheel or using other visual cues, such as pictures or animals to represent each set of rules.

While our results support the effectiveness of the Color Wheel System in reducing student behaviors, they give little information regarding teacher behaviors. One major goal of the Color Wheel System is to reduce time spent transitioning, thus increasing time spent on instruction. While data show that, for the most part, teachers implemented the Color Wheel System with integrity, and that two out of three teachers indicated that the Color Wheel System reduced transition time (the third teacher did not mention it during the acceptability interview), it is unclear whether the procedures actually reduced transition time. Future researchers may want to investigate the degree to which the Color Wheel System procedures reduce transition time and increase time spent teaching.

Another component of the Color Wheel System is teacher praise for rule-following behavior. Dufrene et al. (2012) found that an increase in teacher praise

resulted in a decrease in students' disruptive behaviors. Our integrity data show that all three teachers used praise to acknowledge students who followed Color Wheel System rules; however, we did not collect data on the quantity of praise or type of praise given by teachers. Training procedures encouraged teachers to praise students in a variety of manners (e.g., verbal praise, high fives, fist bumps). Future researchers may want to investigate the nature (e.g., type, form) of teacher praise with the Color Wheel System and how it relates to student behaviors.

Finally, we encourage future researchers to investigate the long-term effects of the Color Wheel System. McGoey et al. (2010) suggest that students who display disruptive behavior in early grades are at-risk for academic and behavioral problems as they progress through school. Future researchers may be interested in conducting a longitudinal study that tracks the progress of young students who learned the Color Wheel System procedures in pre-school or kindergarten. A study such as this may examine the long-term effects of Color Wheel System in early grades and whether they prevent or reduce disruptive behavior in later grades. One goal of the Color Wheel System is to reduce time spent transitioning to increase time for students to learn. Future investigators could determine whether students exposed to the Color Wheel System in early grades make greater academic gains than those who were not exposed the Color Wheel System.

Additional studies are needed to track the long-term effects of the Color Wheel System on teachers. If the Color Wheel System results in lower instances of disruptive behaviors, it may also lessen the incidence of teachers punishing benign or incidental

inappropriate behaviors, which often leads to more severe inappropriate behaviors (Fudge et al., 2008). For example, a student may become oppositional if he or she feels they are being unfairly punished for an incidental behavior. Additionally, as classrooms with unfair punishment have been associated with learned helplessness (Seligman, 2002), separation anxiety, and attachment disorder (Birch & Ladd, 1996, Birch & Ladd, 1997; Pianta et al., 1995) in students who are just beginning school, longitudinal studies are needed to track the occurrence of these symptoms in children exposed to the Color Wheel System and those not exposed. Teachers who use the Color Wheel System consistently may also experience less frustration and burnout as a result of reduced disruptive classroom behaviors (Below et al., 2008).

### **Theoretical and Applied Implications**

Despite these limitations, there are theoretical and applied implications related to the findings that could guide future research. One concern in working with young students is their ability to learn multiple sets of rules. Perhaps out of doubt for young students' capacity to learn and remember several rules, previous researchers have recommended using only one set of three-five classroom rules (Buck, 1999; Malone & Tietjens, 2000). Results of previous Color Wheel System studies show that young students are capable of learning and remembering multiple sets of classroom rules (Below et al., 2008, Blondin et al., 2012). The current study is consistent with previous research showing that students as young as five and six quickly learned and followed multiple sets of rules. Likewise, previous acceptability measures (Fudge et al., 2008) for

the Color Wheel System suggest that students may actually prefer the structure provided by the procedures.

The current study also has applied implications. Our findings strengthen the evidence of internal validity for the Color Wheel System with the magnitude of effect size for both inappropriate vocalizations and out-of-seat behavior. While previous CW researchers have suggested that the procedures are effective across students and behaviors, none have employed an experimental design in kindergarten classrooms. Our results, combined with previous research, suggest that the Color Wheel System is effective across students and behaviors in primary-level classrooms. From an applied perspective, results of the study show that the Color Wheel System can be implemented effectively in multiple kindergarten classrooms.

The current study was initiated by a principal who was interested in implementing a school-wide behavior management system. She wished to pilot the procedures in the kindergarten classrooms at her school. While there may have been concerns with students this young learning the procedures without being able to read, our findings also show that color wheel procedures are easily and effectively learned by students as young as age five. Likewise, one teacher reported that the Color Wheel System helped her better prepare her students for first grade by requiring them to raise their hands to speak. Since the Color Wheel System worked well with students in kindergarten, the procedures may generalize to pre-school classrooms geared to prepare students for kindergarten. Our findings are also important for educators and administrators wishing to implement

school-wide programs by showing the procedures can be successfully applied across multiple classrooms.

### **Summary**

Murphy et al. (2007) indicated that disruptive behaviors are the most prevalent behavior problems in young students and include: failure to follow directions (McGoey et al, 2010), leaving seats without permission (Carter et al., 2006; Choate et al., 2007; Patterson, 2009), and talking out or making distracting noises (Kirk et al., 2010). The current study suggests that the Color Wheel System effectively reduces two of these disruptive behaviors. Our results showed large, immediate decreases in inappropriate vocalizations and out-of-seat behaviors after implementation of the Color Wheel System procedures. The current study extends the research on the Color Wheel System by showing evidence of external validity and validating the procedures in kindergarten classrooms. While we did not find evidence that the Color Wheel System affects student perception of classroom climate, we did find that teachers reported a high level of acceptability for the procedures. Thus, the current study indicates that the Color Wheel procedure can be effectively used in kindergarten classrooms to reduce disruptive behaviors.

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## Appendices

## Appendix A

### Modified Classroom Climate Survey

#### My Class Inventory

#### Student Actual Short Form—Revised<sup>1</sup>

Research #: \_\_\_\_\_

Teacher: A B C

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#### **Directions:**

My name is Tiffany Watson. I am a student at the University of Tennessee. I want to learn about your classroom.

If you do not want to answer a question, you can skip it. You can tell me you want to stop at any time and we will stop.

Your teacher will be in the room with us when we talk.

Say “yes” if the sentence is true.

Say “no” if the sentence is not true.

#### EXAMPLE

I like pizza.

I like broccoli.

If you like pizza, you will say “yes”  
“yes”

If you like broccoli, you will say

If you don’t like pizza, you will say “no”  
say “no”

If you don’t like broccoli, you will

|                                                          |     |    |
|----------------------------------------------------------|-----|----|
| 1. We like doing work in our class                       | Yes | No |
| 2. There are fights in my class                          | Yes | No |
| 3. Everyone tries to finish their work first in my class | Yes | No |

\_\_\_\_\_

|                                                                            |     |    |
|----------------------------------------------------------------------------|-----|----|
| 4. In my class everyone is my friend                                       | Yes | No |
| 5. Some students are not happy in my class                                 | Yes | No |
| 6. Some students in my class are mean                                      | Yes | No |
| 7. We try to make our work better than our friends                         | Yes | No |
| 8. Some students in my class are not my friend                             | Yes | No |
| 9. We like our class                                                       | Yes | No |
| 10. A lot of people in class like to fight                                 | Yes | No |
| 11. Some students feel bad when their work isn't as good as others         | Yes | No |
| 12. Everyone is good friends in my class                                   | Yes | No |
| 13. Some students don't like my class                                      | Yes | No |
| 14. Some students get upset if they can't do what they want to do          | Yes | No |
| 15. Some student always try to make their work better than everyone else's | Yes | No |
| 16. Everyone in my class likes each other                                  | Yes | No |
| 17. My class is fun                                                        | Yes | No |
| 18. Students in my class fight a lot                                       | Yes | No |
| 19. Some students in my class always want to be first                      | Yes | No |
| 20. Students in my class like each other                                   | Yes | No |

## Data Collection Sheet

[illegible]

## Appendix C

### Teacher Script for Day 1 of Implementation

#### **Color Wheel Script**

“We will be following three sets of rules in class. (Turn wheel to red). The Red rules are: in seat or carpet spot, no talking, no hand raising, eyes and ears on teacher. We will be using this when switching from one activity to another. I will give you two warnings before turning to red.”

“(Turn wheel to Yellow) the Yellow rules are: in seat or carpet spot, raise hand to speak, hands and feet to self, eyes on teacher/work, follow directions. We will be on this color when working as a whole group or when you are doing seat work by yourself.”

“(Turn wheel to green) Finally, the Green rules are: use inside voice to talk to others, respect others/teacher, hands and feet to self, follow directions. I will turn to green during free time.”

Now let’s read the rules again. Repeat after me. (Turn wheel to Yellow. Read rules for each color aloud and allow students to repeat each rule).

## Appendix D

### Teacher Integrity Checklist

Date: \_\_\_\_\_

Observer: \_\_\_\_\_

Teacher: A B C

#### Implementation-Classroom Set-up

- ☐ Color Wheel displayed in a visible location.

#### Implementation-Procedures

- ☐ Provided a 2-min warning before changing color wheel to red
- ☐ Provided a 30-s warning before changing color wheel to red
- ☐ Turned color wheel to red
- ☐ Provided instructions or direction for next activity while on red
- ☐ Turned Color Wheel to yellow or green
- ☐ Answered students' questions
- ☐ Praised or prompted student responses to Color Wheel

Number of times teacher did not use Color Wheel System for transitions:

\_\_\_\_\_

## Appendix E

### Teacher Acceptability Form

**Directions:** Please indicate your agreement with each item by circling the number.

|                                                                                         | Strongly<br>Disagree | Disagree | Slightly<br>Disagree | Slightly<br>Agree | Agree | Strongly<br>Agree |
|-----------------------------------------------------------------------------------------|----------------------|----------|----------------------|-------------------|-------|-------------------|
| 1. The Color Wheel was a good intervention.                                             | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 2. Most teachers would find the Color Wheel appropriate to deal with classroom behavior | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 3. The Color Wheel helped me stay consistent                                            | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 4. I noticed students' behavior improve when the Color Wheel was used.                  | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 5. Transitions were easier when I used the Color Wheel.                                 | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 6. I spent less time disciplining students when using the Color Wheel.                  | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 7. The Color Wheel quickly improved students' behavior.                                 | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 8. I will use the Color Wheel for the remainder of the year.                            | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 9. I will use the Color Wheel with future classes.                                      | 1                    | 2        | 3                    | 4                 | 5     | 6                 |
| 10. I would recommend the Color Wheel to other teachers.                                | 1                    | 2        | 3                    | 4                 | 5     | 6                 |

## Appendix F

### Semi-Structured Teacher Acceptability Interview

*I would like to hear more about your experience with the Color Wheel System. This will in no way affect the results of my dissertation but will serve to improve future implementation.*

1. In your opinion, was the Color Wheel effective?
2. What other behaviors improved after implementing the Color Wheel?
3. Did it improve any of your personal behaviors (e.g., consistency with classroom management)?
4. Did you observe any negative side effects on student behavior, classroom procedures, or me being in the classroom?
5. Is there anything you did not like about the Color Wheel?
6. Is there anything you would change with the procedures?
7. Were there any students that did not show improvements with the Color Wheel?
8. Did the Color Wheel save time by reducing time spent transitioning?
9. Was the Color Wheel worth the time and effort applied?
10. What other positive behaviors did the Color Wheel affect in your classroom?

Appendix G  
Principal Approval Letter



708 Sam Houston School Road  
Maryville, TN 37804  
865.980.1455  
865.980.1451 FAX

**Buffy Wyrosdick**  
Principal

**Steve Lafon**  
Assistant Principal

September 4, 2014

To the IRB at The University of Tennessee:

The research planned by Tiffany Watson under the direction of Dr. Chris Skinner is a well-developed and interesting design. After reading the procedures in the proposed IRB Form B and being assured that parental consent and student assent would be secured for every research participant, I am satisfied that every effort has been made to protect the safety of the students here at Eagleton Elementary. I have also been assured that the names of any student participating will be kept confidential. The complete and detailed explanation I received from a member of the research team allows me to have full confidence in supporting this research. And, I do hereby give my permission for this research to be completed at Eagleton Elementary.

If you have any further questions, please feel free to call my office at (865) 980-1455

Thank you,

Michelle (Buffy) Wyrosdick, Principal

Appendix H  
System Approval Letter

**Director of Schools**

Rob Britt

831 Grandview Drive  
Maryville, TN 37803  
(865) 984-1212  
Fax: (865) 980-1002



**Board of Education**

Chris Cantrell  
James Compton  
Charles Finley  
Trevis D. Gardner  
Fred Goins  
Scott Helton  
Debbie Sudhoff

~Educational Excellence For All Students~

Ms. Tiffany Watson  
Doctoral Student  
University of Tennessee

October 29, 2014

Dear Ms. Watson,

May this letter document permission for you to conduct the CWS (Color Wheel System) research project at Eagleton Elementary School during the 2014-15 year as part of your degree requirements at the University of Tennessee. I have reviewed the description of your research and your process for notification to parents about the study. As noted in your description, neither students nor the school will be identified in your study, and parents will be provided with an opportunity for consent. Please work directly with Ms. Wyrosdick in the drafting and dissemination of the consent document so that she will be informed about the process and responses. Teacher participation in any research is voluntary, and all activities (including classroom projects) of the school are under the supervision of the principal.

Feel free to contact me if you need additional documentation of this approval.

Sincerely,

A handwritten signature in cursive script that reads "Jane Morton".

Jane Morton, Ed.D.  
Supervisor of 6-12 Instruction  
Director of Schools designee for research approval

CC: Dr. John Dalton, K-5 Instructional Supervisor

~Uncompromising Educational Service~

Appendix I  
Teacher Consent Form

Dear Teacher,

My name is Tiffany Watson. I am in the School Psychology Ph.D. program at the University of Tennessee. I would like to conduct research in your classroom under the supervision of my advisor, Dr. Christopher H. Skinner, a professor at the University of Tennessee. The purpose of my study is to make classroom rules very clear in hopes of increasing rule following and making class better for everyone. Likewise, I would like to spend 3-5 minutes with each of your students (whose parent has provided consent) to ask questions about his or her classroom experience. By the end of the study, we hope to decrease inappropriate verbalizations and out-of-seat behaviors in the classroom. In addition, we hope to evaluate the effects of the management system on students' perception of their classroom experience. Eagleton Elementary School principal, Ms. Buffy Wyrosdick has agreed to participate in these procedures designed to make classroom rules very clear.

If you agree to participate, your students will be asked to complete a brief survey in the fall and again in the spring. Each student who agrees to participate (and whose parent has provided consent) would meet with me individually in the corner of the classroom to answer questions about his or her classroom experience. Students will be read each of the 20 items and asked to respond "yes" or "no" to each.

I would also like you to implement the Color Wheel System Color Wheel System, a classwide management system designed to make classroom rules very clear. A brief description of the Color Wheel System is included at the end of this letter. The management system will easily be incorporated into your class structure. I will provide all materials needed for your classroom and I will meet with you to go over the system, practice the procedures, and answer any questions you have about the system before implementation in your classroom.

I will observe the classroom each day for approximately 5 weeks. I will quietly enter your classroom and take a prescribed assigned chair in the back, and collect data. During the first phase I will observe your students using your current classroom management system. During the second phase, I will observe your students using the Color Wheel System. This will allow us to see if the Color Wheel System is effective at decreasing inappropriate verbalizations and out-of-seat behavior in kindergarten students. You are free to request that my involvement in the classroom be discontinued at any time with no penalty to you or the participating students.

No risks for teachers or students are anticipated from this study other than those ordinarily encountered in the classroom. Your name will not be recorded on any of the materials in this study. Instead, your identity will be recorded as "Teacher of Classroom

A, B, or C.” Student participants’ names will not be on the data forms, as I am not collecting data on individual students. In addition, students’ names will be entered onto a separate sheet and assigned a code number for survey responses. Again, students’ names will NOT be revealed.

Participation in this study is voluntary, which means that you do not have to participate and can stop at any time without penalty. Although results of our research may be shared with others through professional publications or presentation, your name or the names of your students will never be revealed.

Enclosed is a copy of this letter for your records. If you agree to participate in this research, please complete the section below on one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, that you willingly agree to participate, and that you may withdraw at any time and discontinue participation without penalty. If you have any questions about this consent form or this study, please feel free to contact my faculty advisor, Christopher Skinner at (865) 974-8403, or myself (Tiffany Watson) at (865) 850-6656 **before** you sign this form.

Thank you for your time and consideration,

Tiffany Watson, M.S.  
University of Tennessee  
Educational Psychology and Counseling  
Knoxville, TN 37996  
(865) 850-6656

Check One

\_\_\_\_\_ I DO agree to participate in this research.

\_\_\_\_\_ I DO NOT agree to participate in this research.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
Teacher

## Appendix J

### Description of Color Wheel Procedures

#### The Color Wheel System (Color Wheel System)

Recently, researchers have investigated the Color Wheel System (Color Wheel System), a prevention procedure that employs specific rules for specific activities and transition procedures for moving the class from one set of rules to another as they move from one activity to another (Skinner & Skinner, 2007). The Color Wheel System was developed in the early 1980's by educators/researchers (i.e., Drs. Gina Scale, Deb Dentis, and Edward Lentz) as a component of a comprehensive classroom management system that would be applied across all students and grade levels at a laboratory school serving students with emotional and behavioral disorders (EBD). The Color Wheel System involves several stimuli including posted rules, the wheel itself, and verbal cues delivered by the teacher.

**Materials.** The color wheel is constructed from inexpensive ubiquitous materials (cardboard, construction paper, tack). The color wheel is posted in the front of the class where the teacher frequently delivers class-wide directions/instructions. Like a traffic light, the color wheel contains three colors (red, yellow, and green), indicating current behavioral expectations. The wheel is always "on" with the displayed color indicating a specific set of rules or behavioral expectations that are currently in place. Thus, with the Color Wheel System there are three sets of classroom rules; red rules, yellow rules, and green rules, which are summarized in Table 1 (Skinner, Scala et al., 2007; Skinner & Skinner, 2007).

*Table 1. Color Wheel System Posted Classroom Rules.*

| Red Rules                                                                                                                                            | Yellow Rules                                                                                                                                                                | Green Rules                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1. Desk clear<br>2. Seat in seat ("in area"-good for floor activities)<br>3. Eyes on speaker<br>4. No talking<br>5. No hand raising (ready position) | 1. Raise hand to leave seat<br>2. Raise hand to speak (not "no talking")<br>3. Eyes on speaker or work (not "on-task")<br>4. Follow directions<br>5. Hands and feet to self | 1. Use inside voices<br>2. Respect others<br>3. Hands and feet to self<br>4. Follow all directions |

Red rules are used when a teacher needs all students' undivided attention. Teachers are trained to use red for every activity transition in order to influence students to cease their current activity and attend to instruction for the next activity. The yellow rules are designed to set behavioral expectations for many different academic activities including independent seat-work, academic games, tests, teacher-led instruction, and peer presentations. The green rules are designed for free time, cooperative academic projects, fine arts, and other activities where teachers want to encourage more spontaneous

interactions. All three sets of rules are taught to the students and posted next to the wheel (Skinner et al., 2007).

**Color Wheel System procedures.** The Color Wheel System includes procedures for transitioning from one activity to another and one set of rules to another. Specifically, before the class stops their current activity they are given two warnings, a 2-min (e.g., “The color wheel is going to red in 2 minutes”) and a 30-s warning (Kern & Clemens, 2007). After the warning time has elapsed the teacher turns the wheel to red and faces the students who, if they are following the red rules, are in their seats, with their desk clear (no materials to distract their attention), they are looking at the teacher, and not talking or even allowed to raise their hand to speak. The teacher then *quickly* communicates with the students. Speed is important because red rules are the most difficult to follow and the more time you spend on red the more likely someone is to break the rules. For example, with all students paying attention, the teacher may praise the group for following red rules, instruct the students that after she turns the color wheel to yellow they are to take out some scrap paper, a pencil, and their math text and turn to page 76. After turning the wheel to yellow, some students may raise their hand and let the teacher know that they need something to be able to complete the next task (e.g., sharpen their pencil, forgot their text book). Additionally, the teacher may need to address other concerns (e.g., to go to the bathroom). After dealing with these issues all at once, teacher-led instruction can begin without interruption and without having to repeat, re-direct, re-instruct, or reprimand. Other, more subtle Color Wheel System procedures and a rationale for each procedure are summarized in Table 2 (Skinner et al., 2007).

*Table 2. Color Wheel System Procedures and Procedure Rationales.*

| Procedure                                                                                                                                   | Rationale                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Teach the students the rules. Read/recite frequently (McIntosh et al., 2004).                                                            | Students have to know rules. Repeating and reciting rules may serve as antecedent stimuli for rule-following behavior.                                                                                                |
| 2. Post wheel and written rules next to each other near where group directions/instructions are typically delivered.                        | All three stimuli visible at the same time make it easier for students to know and follow the rules. Also, having the wheel close allows the teachers to change it after finishing delivering instructions/directions |
| 3. Write rules using your own colloquialisms (seat-in-seat) and make them brief.                                                            | Child learning and understanding is critical, not language used. Briefly worded rules allow for rapid recitation.                                                                                                     |
| 4. Fade warnings, recitations and praise as year goes on, but do not stop as you may need to rehearse a bit as new students enter the room. | At some point too much repetition and recitation is unnecessary.                                                                                                                                                      |
| 5. Use red frequently, for almost every activity transition so that you can clearly communicate with the class.                             | Establishing transition routines is important and consistency helps some students' behavior appropriately.                                                                                                            |

|                                                                                                                                                                       |                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6. Almost always transition using red. Do not go from yellow to green. Instead go from yellow to red to green.                                                        | You want to make it clear that one activity has ended before beginning another activity.                                                                                                  |
| 7. Keep time on red brief. Do not teach or provide lectures (academic) on red.                                                                                        | You want to occasion rule-following behavior. The longer you are on red the more likely someone will break a rule.                                                                        |
| 8. After quick directions/instruction on red turn back to yellow and respond to raised hands.                                                                         | You may have a child who needs immediate attention (e.g., really, really has to go to bathroom).                                                                                          |
| 9. DO NOT USE RED AS PUNISHMENT                                                                                                                                       | You want to occasion rule following. It is unlikely that the entire class misbehaved and deserves punishment, so those who behaved well may resent this punishment and break red rules.   |
| 10. Praise students for rule-following behavior. Do not say something like "Well it is about time you grow up and behave! Why haven't you been doing this all along"? | The goal of Color Wheel System is rule following and praising rule-following is likely to increase this behavior and enhance the quality of the classroom environment.                    |
| 11. You may use time on green as a group reward (all or none of the students get the time on green).                                                                  | Time on green allows students to engage in preferred behaviors and therefore can be a powerful and efficient reward for each student.                                                     |
| 12. You, not the students, turn the wheel.                                                                                                                            | Many students will take directions from adults but not peers. Also, although the wheel cost little to make, it does take time to make the wheel and children may accidentally destroy it. |

### References

Kern, L., & Clemens, N.H. (2007). Antecedent strategies to promote appropriate classroom behavior. *Psychology in the Schools*, 44(1), 65-75.

Skinner, C. H., Scala, G., Dendas, D., & Lentz, F.E. (2007). The color wheel: Implementation guidelines. *Journal of Evidence-Based Practices for Schools*, 8(2), 134-140.

Skinner, C. H., & Skinner, A. L. (2007). Establishing an evidence base for a classroom management procedure with a series of studies: Evaluating the Color Wheel. *Journal of Evidence-Based Practices for Schools*, 8(2), 88-101.

## Appendix K

### Parental Consent Form

Dear Parent,

I am in the School Psychology Ph.D. program at the University of Tennessee and currently working on research to make classroom rules very clear in hopes of increasing rule following and making class better for everyone. I am seeking your permission to spend 3-5 minutes with your child to ask questions about their classroom experience. Eagleton Elementary School principal, Ms. Buffy Wyrosdick, and your child's teacher have agreed to participate in procedures designed to make classroom rules very clear. I will be supervised by Christopher H. Skinner, a professor at the University of Tennessee.

If you agree to allow your child to participate, your child will be asked to complete a brief survey in the fall and again in the spring. Your child, along with other students who agree to participate, would meet with me individually in the corner of the classroom to answer questions about his or her classroom experience. Your child would be read each of the 20 items and asked to respond "yes" or "no" to each. Your child's name will be entered onto a separate sheet and assigned a code number. Your child's name will NOT be revealed.

Participation in this study is voluntary, which means that your child does not have to participate and can stop at any time without penalty. A teacher will be present during all procedures. The study will have no effect on your child's grade. No one at the school or anywhere else will know what answers your child provided. Although results of our research may be shared with others through professional publications or presentation, your child's name will never be revealed.

If you have any questions about this consent form or this study, please feel free to contact my faculty advisor, Christopher Skinner at (865) 974-8403, or myself (Tiffany Watson) at (865) 850-6656. If you agree to allow your child to participate in this research, please check the appropriate box and sign the form in the space provided for parental signature or legal guardian. Thank you for your and your child's time and consideration,

Tiffany Watson, M.S.  
University of Tennessee  
Educational Psychology and Counseling

#### Check One

\_\_\_\_\_ I DO agree to allow my child to participate in this research.

\_\_\_\_\_ I DO NOT agree to allow my child to participate in this research.

Child's Name: \_\_\_\_\_

Parent/Guardian Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Table 1

| <i>Schedule</i> | Baseline   | Training    | Intervention | Maintenance |
|-----------------|------------|-------------|--------------|-------------|
| Classroom A     |            |             |              |             |
| <i>Dates</i>    | 2/4 – 2/12 | 3/2 - 3/3   | 3/4 - 4/3    | 4/9 – 4/23  |
| <i>Sessions</i> | 5          | 2           | 12           | 3           |
| Classroom B     |            |             |              |             |
| <i>Dates</i>    | 2/4 – 3/9  | 3/6 - 3/9   | 3/10 – 4/3   | 4/9 – 4/23  |
| <i>Sessions</i> | 8          | 2           | 9            | 3           |
| Classroom C     |            |             |              |             |
| <i>Dates</i>    | 2/4-3/12   | 3/25 - 3/26 | 3/27 – 4/3   | 4/9 – 4/23  |
| <i>Sessions</i> | 10         | 2           | 6            | 3           |

*Note.* Sessions = total number of observation or training days.

Table 2

*Descriptive Statistics and Effect Size Estimates for Inappropriate Vocalizations from Baseline to Intervention (ES1), Baseline to Maintenance (ES2), and Intervention to Maintenance (ES3).*

|             | TCM         | CWS         | MTN         | ES1      |          | ES2      |          | ES3      |          |
|-------------|-------------|-------------|-------------|----------|----------|----------|----------|----------|----------|
|             | M (SD)      | M (SD)      | M (SD)      | <i>d</i> | <i>g</i> | <i>d</i> | <i>g</i> | <i>d</i> | <i>g</i> |
| Classroom A | 88.0 (9.6)  | 45.2 (6.8)  | 37.1 (5.3)  | 5.1      | 5.3      | 6.5      | 5.2      | 1.3      | 1.1      |
| Classroom B | 88.3 (8.5)  | 20.8 (11.1) | 23.0 (14.5) | 6.9      | 6.5      | 5.5      | 5.9      | -0.2     | -0.2     |
| Classroom C | 82.8 (12.0) | 23.5 (7.5)  | 17.0 (1.9)  | 6.0      | 5.3      | 7.7      | 5.7      | 1.2      | 0.9      |

*Note.* TCM = baseline phase data; CWS = intervention phase Data; MTN = maintenance phase data.

Table 3

*Descriptive Statistics and Effect Size Estimates for Out-of-Seat Behavior from Baseline to Intervention (ES1), Baseline to Maintenance (ES2), and from Intervention to Maintenance (ES3)*

|             | TCM         | CWS       | MTN       | ES1      |          | ES2      |          | ES3      |          |
|-------------|-------------|-----------|-----------|----------|----------|----------|----------|----------|----------|
|             | M (SD)      | M (SD)    | M (SD)    | <i>d</i> | <i>g</i> | <i>d</i> | <i>g</i> | <i>d</i> | <i>g</i> |
| Classroom A | 11.9 (6.7)  | 7.1 (2.6) | 7.7 (2.2) | 1.0      | 1.1      | 0.8      | 0.7      | -0.2     | -0.2     |
| Classroom B | 18.5 (10.4) | 8.7 (4.6) | 9.5 (3.8) | 1.2      | 1.2      | 1.1      | 0.9      | -0.2     | -0.2     |
| Classroom C | 14.1 (5.6)  | 5.9 (2.8) | 7.1 (3.9) | 1.9      | 1.6      | 1.5      | 1.2      | -0.4     | -0.4     |

*Note.* TCM = baseline phase data; CWS = intervention phase Data; MTN = maintenance phase data.

Table 4

*Descriptive Statistics and t-test Results for Perception of Classroom Climate Survey*

| Outcome     | <u>Pretest</u> |      | <u>Posttest</u> |      | <i>n</i> |
|-------------|----------------|------|-----------------|------|----------|
|             | M              | SD   | M               | SD   |          |
| Classroom A | 47.50          | 3.42 | 42.50           | 3.00 | 4        |
| Classroom B | 43.00          | 7.36 | 41.67           | 4.96 | 12       |
| Classroom C | 41.78          | 4.74 | 43.56           | 4.78 | 9        |
| Full Sample | 43.28          | 6.3  | 42.48           | 4.56 | 25       |

---

\*  $p < .05$ .

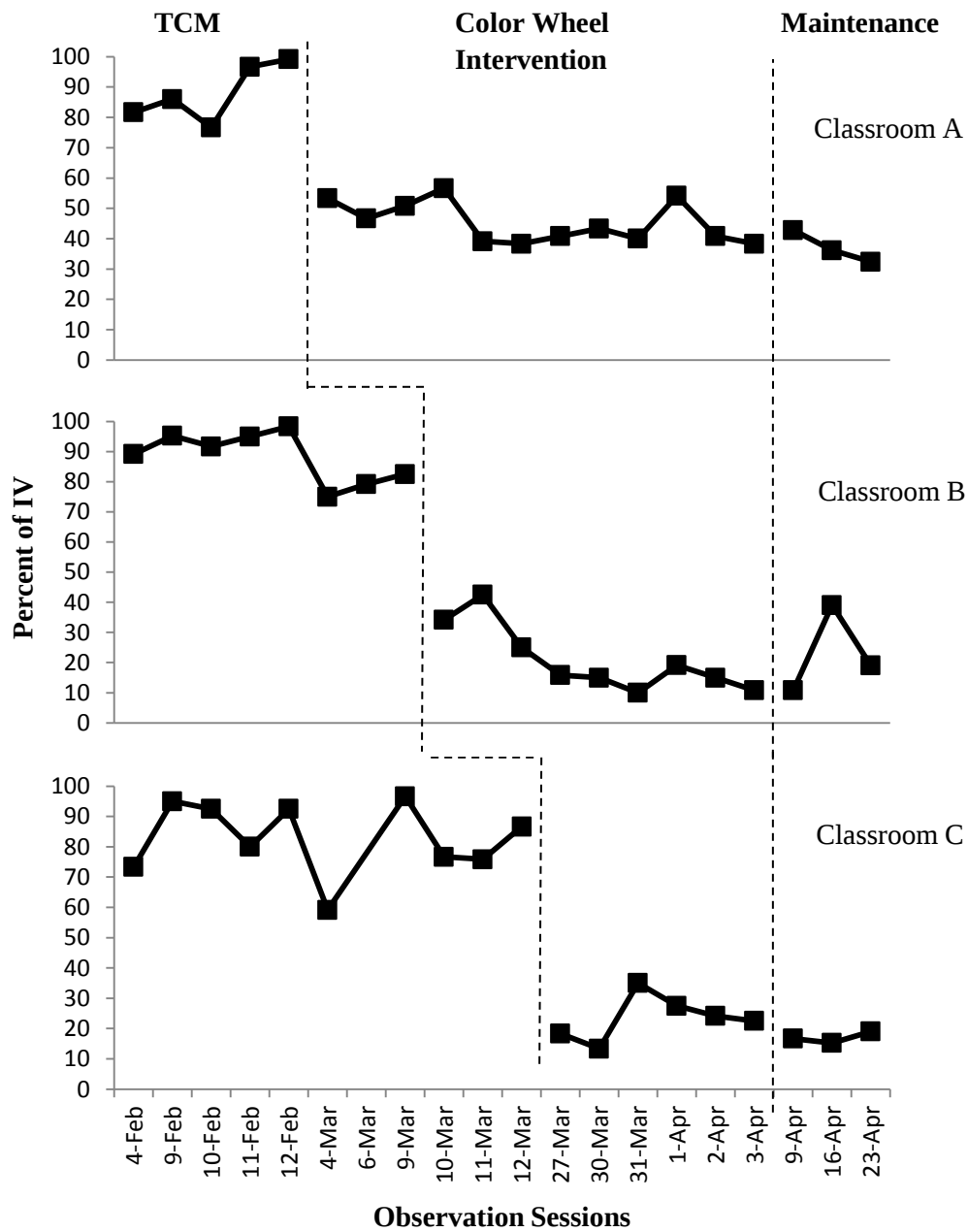


Figure 1: Average percentage of intervals in which an inappropriate vocalization occurred during typical classroom management (TCM), Color Wheel Intervention, and maintenance phases.

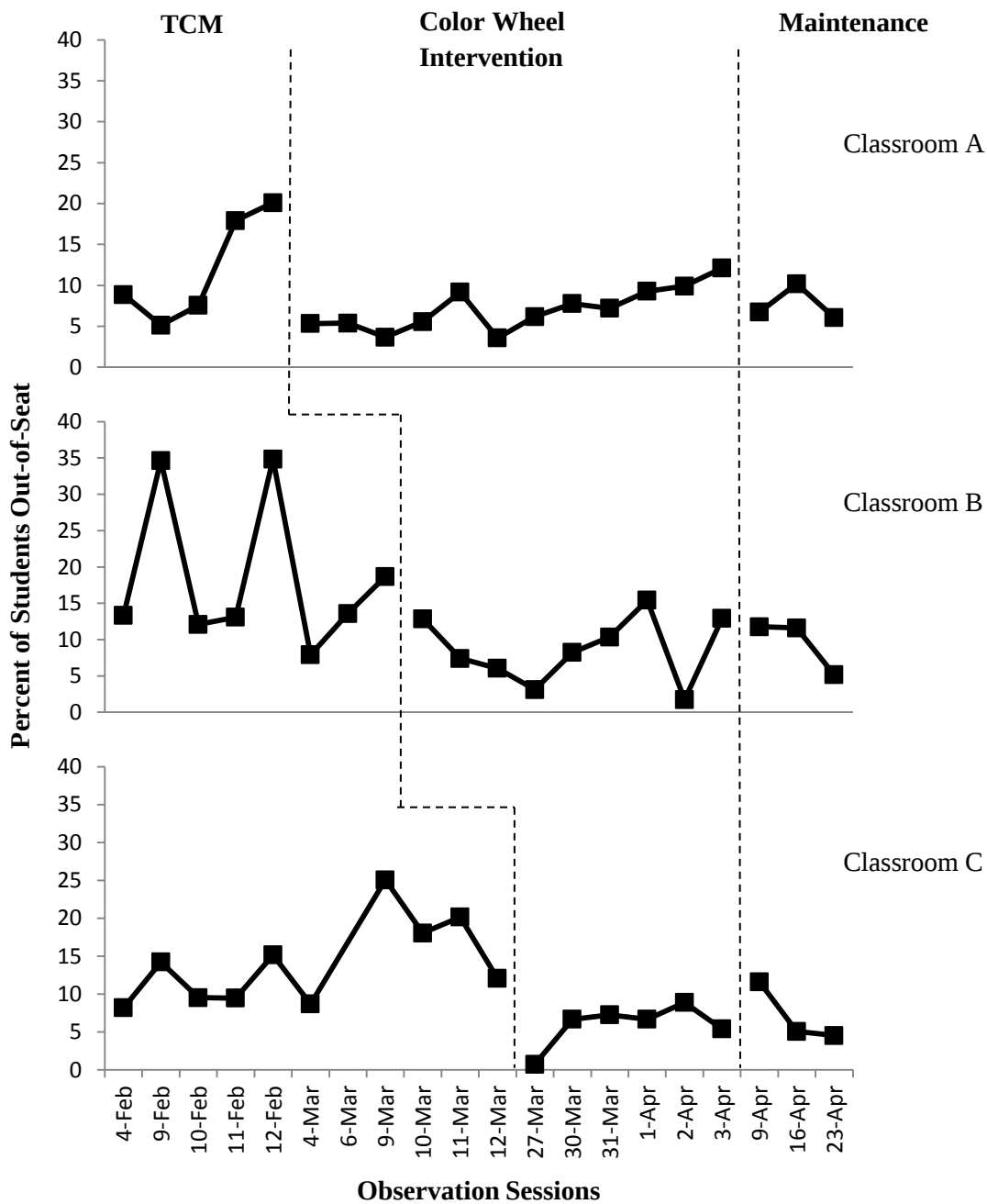


Figure 2: Average percentage of students out-of-seat (out-of-seat behavior) per session across typical classroom management (TCM), Color Wheel Intervention, and maintenance phases.

### **Vita**

Tiffany Watson was born in Knoxville, Tennessee and grew up in Maryville, Tennessee. She graduated with a B.S. in Psychology from Union University in 2011. In 2011, Tiffany entered the University of Tennessee's School Psychology Ph.D. Program. She graduated with an M.S. in Applied Educational Psychology from the University of Tennessee in May of 2014. Tiffany will receive her Ph.D. in School Psychology in August 2016 following completion of a year-long internship with Tennessee Internship Consortium in Knoxville, TN.