

**Implementing the Color Wheel System to Improve Individual Student Behavior and
Reduce Repeated Teacher Directions**

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Jade Reese Bennett
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Abstract

Researchers have demonstrated the Color Wheel System (CWS) to be a resource-efficient and effective classroom management system within various contexts; however, there is limited research examining the impact of the CWS on teacher behavior (i.e., reducing repeated teacher directions) and individual student in-seat behavior. Using a withdrawal (ABAB) design, the purpose of this study was to evaluate the effectiveness of the CWS in decreasing repeated teacher directions and increasing student in-seat behavior. Momentary time sampling was used to record individual student in-seat behavior. Frequency recording over a 20-min time interval was used to record repeated teacher directions and frequencies were converted into rate data. Analyses were conducted on the rate of repeated teacher directions and in-seat behavior of three target students within a general education first-grade classroom. We also evaluated the acceptability of the CWS from the participating teacher and the whole class.

Results of this study provided evidence to support the CWS as an effective classroom management system based on teacher behavior. Visual analysis of a time series graph found that the CWS effectively decreased the rate of teacher repeated directions. Individual student in-seat behavior data presented less clear outcomes with students having high and variable rates of behavior from the onset of the study. Survey data show the teacher found the intervention to be useful in the classroom. Survey data show that the majority of students found the intervention to be acceptable and impactful in their classroom. Discussion focuses on theoretical and applied implications of this study. Study limitations and considerations for future researchers are also discussed.

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Chapter 1

Literature Review

Classroom Management

Effective classroom management optimizes the delivery and retention of academic and social-emotional information (Emmer & Sabornie, 2015). Classroom management procedures can be adapted based on the goals of the classroom and the attributes of the students within; however, researchers have found that effective classroom management techniques have similar components (e.g., consistency, clarity, routines). These techniques can be found within other common behavioral management techniques such as the antecedent-behavior-consequence model, setting events, and other environmental adjustments. Effective classroom management techniques are those that increase organization within the classroom, make students aware of expectations and routines, and facilitate a safe and efficient learning environment (Cameron et al., 2005; Emmer & Sabornie, 2015).

The purpose of classroom management is to create a classroom environment that runs smoothly and decreases inappropriate and disruptive behaviors. Researchers found that teachers who consistently implemented effective classroom management procedures that used both clear expectations and routines saw a decrease in disruptive behaviors and an increase in on-task behaviors (Evertson et al., 1983). Having effective classroom management procedures in place also allows teachers to have the time and space to attend to students who may require more intensive direct intervention by reducing the disruptive behaviors of other students in the classroom (Cameron et al., 2005; Saecker et al., 2008). Additionally, researchers have found that students who may require more intensive direct intervention benefit from the use of evidence-based classroom management procedures (Abramowitz & O’Leary, 1991). When a teacher must

spend significant time reacting to individual undesired behaviors, other students are affected. Hayling et al. (2008) indicated more time being spent without teacher-led instruction resulted in students not actively engaging in academics and an increase in disruptive behaviors. Reducing disruptive in-class behavior and, often concurrently, increasing on-task behavior are significant outcomes of effective classroom management procedures (Hallahan & Sapona, 1983).

Classroom management has been identified as a difficult area in which to effectively train pre-service teachers (Eisenman et al., 2015). This lack of training is evidenced by prevailing rates of undesired behavior in classrooms and the number of office discipline referrals within school systems. A qualitative study conducted by Arnett (2012) further demonstrated the difficulty that teachers, notably those within the start of their careers, face across fields. When polled across several concepts related to teaching methodologies, beginning family and consumer science teachers identified discipline and classroom management as a significant problem (Arnett, 2012). In a study where pre- and in-service teachers were prompted to identify the function of a behavior and reinforcement type used, researchers found that most struggled to accurately complete the task (Yongblum & Filter, 2013). Additionally, they found that pre-service teachers were less skilled than in-service teachers at accurate identification, despite this being an identified area of focus for training programs (Yongblum & Filter, 2013). These pre-service teachers' performance indicates that training programs may not be effectively preparing educators for the application of the material they are being taught.

To promote consistency of use, teachers require behavioral management tools that are resource efficient in terms of time, cost, staff requirement, etc. Many well-known behavioral management systems such as token economies and clip charts require a teacher to dedicate substantial time outside of typical classroom procedures to implement these interventions. A

teacher may have to spend their own money to purchase rewards for the token economy, or take away from academic time to count tokens, address individual undesired behavior, or fulfill reward time (e.g., extra recess, class party). These extraneous responsibilities can lead to a teacher feeling overwhelmed by systems that are meant to make their classroom management more effective and efficient. To increase teacher buy-in and promote consistency of use, a classroom management system that occurs within typical classroom procedures is ideal.

Color Wheel System

The Color Wheel System (CWS) is a classroom management procedure originally designed for classrooms for students with emotional and behavioral disorders across grade levels (Skinner et al., 2007). The CWS is simple in design and implements a trisection-colored wheel, three sets of rules, and verbal warnings. The rules are color-coded (red, yellow, and green) and the corresponding color on the wheel is used to inform students which set of rules are to be followed. Red rules are designed for transition, yellow rules are for academics, and green rules are for free time or other social activities (Fudge et al., 2007; Fudge et al., 2008; Skinner et al., 2007).

Each set of rules was developed to be used for common classroom activities such as academic time, transitions, and free time (see Table 1 for typical CWS rules). Each rule set consists of three to five activity-specific rules as opposed to a single broad list used for overall classroom procedures. Students are explicitly taught each rule set before implementation of the CWS, and the rules are reviewed with decreasing frequency throughout implementation. Verbal warnings are delivered 2-min then 30-s before changing the color of the wheel (Fudge et al., 2007; Fudge et al., 2008; Skinner et al., 2007).

Given the intention for the CWS to be used by teachers, the design of the intervention itself allows for adaptation and easy implementation within a classroom setting (Fudge et al.,

2007; Fudge et al., 2008). For example, an elementary school teacher is concluding their reading lesson for the morning and preparing for the transition between language arts and mathematics. With the color wheel posted at the front of the classroom, the teacher calls out to give the class their 2-min warning stating that they will soon be turning the wheel to red. The class responds by beginning to finish up their worksheets and clear their desks. The teacher then announces the 30-s warning once they see that most of their class has begun to put their materials away. The teacher walks towards the wheel at the front of the classroom, making sure that the teacher is drawing attention to their actions as another form of warning to the students that a transition is about to occur. The teacher will then turn the wheel and slowly move the clip from the yellow section (which indicates academic time) to the red section (which allows the teacher to deliver instructions).

Now with the wheel on red, the entire class has a physical cue that informs them of what rules are now in place. The class begins to respond to the physical cue and abide by the red rules. The teacher should praise students individually and as a group for following the rules during this time using behavior-specific verbal praise. Providing praise reinforces behavioral expectations and establishes the color wheel as a stimulus to elicit desired behavior (Blondin et al., 2012; Fudge et al., 2007; Fudge et al., 2008). When behavioral expectations are unclear, it can be very difficult for students to meet those expectations. Knowing which specific rules are currently in place can increase their behavioral success within the classroom (Blondin et al., 2012; Emmer & Sabornie, 2015; Evertson et al., 1983; Moore et al., 2019). For example, the red rules that students are now following are designed for transition activities and allow teachers to provide clear directions or instructions and enhance the probability that students are attending to teacher directions or instructions.

Continuing with our example, after giving instructions, the teacher announces that they will be moving back to yellow rules and changes the wheel from red to yellow. Yellow rules are designed for academic tasks. Now that the wheel is on yellow, students begin to get out their materials for the next activity. Before beginning instruction, several students raise their hands and the teacher addresses their concerns (e.g., “I forgot my workbook,” “I need to sharpen my pencil”) before beginning instruction. Taking care of these concerns before beginning the academic activity can reduce disruptions during teaching and learning activities. Implementing consistent and repeated activity transitions may reduce transition time, decrease the probability of undesired behaviors, and allow more time to be devoted to teaching and learning activities (Hayling et al., 2008).

Evidence of Effectiveness

Following its development, the CWS was used to both increase desired behaviors and decrease undesired behaviors across a variety of settings and populations. However, empirical evaluation of the effectiveness of the CWS did not occur until much later. Several researchers conducted case studies that demonstrated the potential effectiveness of the CWS across teachers and classrooms (Below et al., 2008; Choate et al., 2007; Saecker et al., 2008). These case studies were often developed in response to teacher need, and as such, the research design of these cases did not allow researchers to draw cause-and-effect conclusions. However, baseline and intervention phase data collected from these studies encouraged other researchers to conduct studies designed to allow for cause-and-effect conclusions across various grade levels and student populations.

Fudge et al. (2007) implemented the CWS in a fourth-grade general education classroom. It was noted that the teacher reported high levels of inappropriate behavior from their students.

Using an ABAB withdrawal design, Fudge et al. evaluated the effects of the CWS on inappropriate talking. Inappropriate talking was defined as any audible verbalization from any student without teacher permission or any instance when one student was oriented towards another student and appeared to be talking (Fudge et al., 2007) .

Fudge et al. (2007) collected data at the same time each day during a period of academic transition. Researchers collected baseline data prior to implementing the CWS. During baseline, typical classroom management procedures were in place. In this classroom, typical classroom management involved the use of a response-cost system that was designed to punish undesired behaviors. Following baseline, researchers taught and reviewed CWS procedures with the classroom teacher. Before the first day of implementation, the teacher posted the color wheel and CWS rules in the classroom. The teacher reviewed rules and CWS procedures with the class and practiced transitions using the color wheel prior to collecting intervention phase data.

During intervention phases, the CWS was implemented all day. During the first week of implementation, the teacher was encouraged to frequently review rules by calling on students to read the rules aloud prior to or immediately after turning the wheel. During the implementation phase, data were collected regarding students' inappropriate verbalization, interobserver agreement, and treatment integrity. During a third phase (i.e., withdrawal phase), the color wheel and CWS rules were removed, and the teacher stopped providing the 2-min and the 30-s transition warnings. In the final phase (i.e., reimplementation), the color wheel and CWS rules were posted once more and color wheel procedures were re-instated.

The results of the Fudge et al. (2007) study indicated CWS procedures were effective in reducing inappropriate talking in a fourth-grade general education classroom. Upon initial implementation and re-implementation of the CWS, there was an immediate and sustained

decrease in inappropriate talking. In the withdrawal phase, there was an obvious increase in inappropriate talking and due to the intensity of this behavior, the teacher insisted that withdrawal phase last only for two data sessions.

During the Fudge et al. (2007) study, the teacher indicated that when he applied the color wheel procedure, he was better able to monitor and punish (e.g., take points) inappropriate verbalizations. He reported that this was, in part, because they occurred less frequently.

Fudge et al. (2008), conducted a follow-up study in a second-grade general education classroom. In this study, the teacher stopped punishing inappropriate behaviors by taking points prior to beginning the baseline phase. Ceasing typical classroom management procedures (TCM) was to ensure the CWS was not effective due to enhancing teacher integrity of implementing TCM punishment procedures. Students were not told that the teacher was no longer taking points. Throughout the remainder of the study, the teacher did not take points. Given the response-cost system that was in place, Fudge et al. (2008) used a single-case (B-C-B-C) design to evaluate the effects of the CWS on increasing class wide on-task behavior (i.e., a student having his/her head oriented towards the work material or person speaking).

As in the previous study, researchers chose a period of transition between academic activities and collected data at the same time each day to best reduce several confounding variables. Researchers collected baseline prior to implementing the intervention while TCM were in place. Again, TCM involved the use of a response-cost system that was designed to punish undesired behaviors. Training and implementation procedures were similar to that of Fudge et al. (2007). The withdrawal phase was conducted as in the previous study; however, during this study the teacher withdrew the intervention for three sessions. Additionally, following the conclusion

of this study, the teacher began taking points again and chose to continue to implement the CWS. Researchers collected periodic maintenance data.

Results of this study support the effectiveness of the CWS on increasing desired behaviors within a second-grade general education classroom. Researchers found on-task behavior increased immediately following implementation of the CWS and upon reimplementation. During the withdrawal phase, on-task behavior immediately decreased and continued at a downward trend. The maintenance phase demonstrated sustained effectiveness of the CWS. Additionally, data indicated high levels of teacher and student acceptability.

Other researchers who used cause-and-effect designs found evidence that the CWS was an effective classroom management procedure. Kirk et al. (2010) conducted two studies which suggest that the CWS was effective in decreasing inappropriate vocalizations in one third-grade and one first-grade classroom. Researchers found that these effects were not improved by the use of interdependent group-oriented rewards or punishment. Blondin et al. (2012) added a fourth colored set of rules (purple) designed to set expectations for small group activities and increase on-task behavior in a fourth-grade classroom. Aspiranti et al. (2018) modified the CWS procedures for classrooms serving students with autism and decreased disruptive behaviors in three self-contained classrooms. Watson et al. (2016) found the CWS decreased inappropriate vocalization in kindergarten students. These studies are examined in more detail in sections below.

Causal Mechanisms

The CWS includes different components that have been shown to enhance expected student classroom behaviors. These components include rules and transition procedures with

various subcomponents. Next, plausible causal mechanisms, which may account for the effectiveness of the CWS, will be described.

Rules

The purpose of rules within a classroom is to set behavioral expectations and to identify and promote consistency in consequences for following or breaking those rules. Within the context of behavioral intervention, rules are considered an antecedent stimulus or a precorrection (Moore et al., 2019). In two studies by Moore et al. (2019), the effects of a brief prompting intervention that involved the use of verbal and visual reminders of rules was evaluated across two classrooms. During small group reading instruction within a special education classroom, one student's disruptive behavior (i.e., behavior that was disruptive to regular school or classroom activities) and time spent engaged in academic tasks was measured. Classroom rules (four in total) were developed and taught to the class prior to the implementation of the intervention. The intervention consisted of two phases: (1) brief prompting with the class where the teacher provided daily verbal and visual prompts to remind students of the classroom rules and (2) a modified version of the intervention where the teacher provided verbal and visual prompting individually to the target student before he entered the classroom, followed by class prompting as in phase 1. Researchers found that intervention phase 1 decreased the target student's disruptive behavior and increased academic engagement. The student's disruptive behavior further decreased following the implementation of intervention phase 2 and the target student was more engaged in academic tasks relative to baseline.

In the second study reported in Moore et al. (2019), three students' on-task behavior was measured in a high school inclusive general education classroom. This study was similar to the first; however, instead of two separate intervention phases, one intervention was implemented.

This intervention was the same as the intervention in phase 1 of the previous study by Moore et al. Researchers found there was an increase in level and trend of data for all three students' on-task behavior when the prompting intervention was first introduced and once it was re-implemented following a period of withdrawal. These two studies demonstrated the effect that rules and prompting can have on a variety of behaviors across grade-levels and students.

As rules are designed to set expectations for behavior, they must be clear and appropriate for the activity. Teachers have been encouraged to implement one set of three to five rules that are applied across the entire school day and all activities. These sets of rules include things such as, *be respectful* and *raise your hand to speak*. Unfortunately, these vague rules often violate characteristics of effective rules (Blondin et al., 2012; Skinner et al., 2007). First, in many cases, rules do not specify behavior clearly. For example, *be respectful* is vague. When rules do not clarify behavior expectations, students may have trouble determining how they are expected to behave (Fudge et al., 2008). Second, rules need to be appropriate for activities. The rule *raise your hand to speak* is appropriate for many, but not all, school activities. For example, small group activities often encourage students to communicate without raising their hands (Blondin et al., 2012).

Unclear expectations also impact how teachers react to student behaviors (Fudge et al., 2007). When rules clearly specify expectations, it can be easier for teachers to enforce (i.e., prompt, reward, punish) rule following or rule breaking behaviors. However, when the rules are unclear, teachers may find themselves inconsistently enforcing rules. For example, a teacher may punish (i.e., take points) when one child breaks a rule, but not when another child breaks the same rule. This inconsistent enforcement can confuse students and cause some students to feel like they are being treated unfairly.

Color Wheel Rules

To address the limitations that arise from the use of few vague rules across all activities, the CWS, which typically consists of three sets of rules for use during different classroom activities, was designed and implemented (Skinner et al., 2007). The rules are color-coded (red, yellow, and green) and the indicated color is used to inform students which corresponding set of rules are to be followed during that time. Each set of rules was developed to be used for common classroom activities such as large group instruction, small group work, independent work, transitions, and free time. Each rule set consists of three to five activity-specific rules. Though initially appearing complex due to the increased number of rules, researchers have shown that providing more specific rules that are reasonable or appropriate for activities increased desired behaviors (i.e., on-task, in-seat) and decreased undesired behaviors (i.e., disruptive, off-task) in the classroom (Aspiranti et al., 2018; Blondin et al., 2012; Fudge et al., 2008; Watson et al., 2016).

Adaptions of the CWS have been found effective at addressing unique activities that may vary classroom to classroom. Blondin et al. (2012) conducted a study in which researchers modified standard CWS procedures in a fourth-grade classroom to include an additional set of rules. This fourth rule set was designed to set behavioral expectations for cooperative learning activities that were unique to the fourth-grade classroom this study was conducted within. Blondin et al. (2012) measured group on-task behavior and found that the implementation of the modified CWS resulted in an immediate increase in on-task behavior both when initially implemented and when re-implemented following a period of withdrawal. This study demonstrated that situation-specific rules are effective in reducing undesired behaviors and increasing desired behaviors in students.

Additionally, this evidence supports the simplicity and adaptability of the CWS.

Research also supported the CWS as a class wide intervention that is effective without the addition of consequences for rule following. Kirk et al. (2010) conducted two studies to evaluate the effect of reinforcement and/or punishment when used in combination with the CWS. One study occurred in a first-grade classroom and the other in a third-grade classroom. Results of these studies concluded that the implementation of CWS procedures reduced inappropriate vocalizations more effectively than interdependent group-oriented punishment. Researchers also found that when the CWS was applied, adding interdependent group-oriented rewards or independent group-oriented punishment had little to no effect on these behaviors. This evidence supports that the CWS is effective as a standalone classroom management system.

Visual Components

Stimulus control is a concept within behaviorism (operant conditioning) that describes the impact that the presentation or removal of a stimulus has on an individual's behavior (Skinner, 1957). Educational researchers have shown that stimulus control is an important component of effective classroom management (Martens & Kelly, 1993). Oftentimes, this is demonstrated through student behavior in the presence of a historically effective teacher versus an ineffective teacher. The effective teacher previously established systems to increase desired behavior within the classroom and thus, the teacher becomes associated with those systems and becomes a stimulus for those established desired behaviors. When this teacher enters the room, students respond to the presence of the stimulus and change their behavior (Martens & Kelly, 1993). Within the CWS, the presence of the color wheel works similarly. The indicated color on the color wheel is a stimulus that is associated with a rule set, or established desired behaviors, and is constantly available to the students. Stimulus control is established between the antecedent

stimuli (i.e., the changing of the wheel, temporal warnings) and the response of students following the behavioral expectations of the indicated color.

The constant availability of the visual stimulus allows students to easily recognize and comply to the routine the CWS establishes for transitions. A predictable routine reduces the amount of time spent away from learning and therefore, decreases the undesired behaviors that often occur during unstructured time in the classroom (Emmer & Sabornie, 2015). Despite having multiple routines within the CWS (i.e., different rules to follow per color), the use of visual components within the CWS may eliminate any confusion from students regarding what behaviors are expected. Additionally, the transition routine of turning the wheel enhances students' awareness that new behavior expectations are being applied.

Transitions

Transition time can be defined as time spent moving between activities, academic areas, and classrooms, as well as time spent waiting for activities to get started (Cameron et al., 2005). Students in lower grades often remain in a singular classroom with a singular teacher for most of the school day. Consequently, these students may have difficulty determining when it is appropriate to begin and end transitioning between activities and/or subjects.

Transitional periods are notoriously staggered, inefficient, and they take up valuable classroom time. In 2002, the National Institute of Child Health and Human Development Early Child Care Research Network found that in a standard first-grade classroom setting, approximately 17% of time was spent in transition. In addition to being a substantial amount of class time, time spent in transition reduces time spent on academic instruction. Furthermore, transition time may be idle time. Idle time is a substantial contributor to disruptive behavior from students and can lead to even more time being spent in transition as those behaviors are addressed

(Hayling et al., 2008). Thus, decreasing transition time may reduce inappropriate behaviors and increase academic learning time (Cameron et al., 2005).

To minimize the negative effects of transition time, the CWS requires the teacher to consistently use procedures and materials that directly denote transitions, eliminate interruptions during transitions, and allow for the efficient delivery of directions or instructions for the next activity (Aspiranti et al., 2018; Blondin et al., 2012; Fudge et al., 2008; Watson et al., 2016). The use of the red section within the CWS denotes a clear start and finish to transition time, allows uninterrupted communication from the teacher, and creates clear expectations for the transition. The use of a 2-min warning and a 30-s warning allow students to begin transitions by stopping the current activity. The physical turning of the wheel in sight of the class allows the teacher to secure student attention as they provide transition information (e.g., directions or instruction regarding the next activity). Turning the wheel away from red clearly marks the end of the next transition and sets expectations for the next activity.

The CWS creates a clear start and finish to a transition and keeps the class on the same schedule. Having a clear set of rules and repeated procedures for transitions also ensures that students are not idle. Instead, students are oriented to the teacher when the next activity is being initiated, eliminating a major contributor to increases in behavioral issues during transitions (Hayling et al., 2008). This efficient transition of all students in the class from one activity to another reduces the need for individual instruction/reminders and can allow students to use peers as references for appropriate behavior (Fudge et al., 2007; Saecker et al., 2008). Saecker et al. (2008) described a case where consultants implemented an A-B design in a fifth-grade classroom to evaluate the impact of the CWS on student inappropriate talking and teacher repeated directions. Data showed that after the CWS was implemented, the teacher provided far fewer repeated

directions. Saecker et al. (2008) suggested that this may have been caused by all students having materials away and attending to directions for the next activity while the color wheel was on red.

Observational Learning and Social Conformity

Social conformity is a component of observational learning that occasions desired behavior within a class of students. Social conformity, in this context, refers to the influence that the behavior of peers has on the behavior of an individual. The impact of social conformity was recognized following a series of experiments that evaluated how an individual would respond to a task when peers consistently gave a blatantly incorrect answer (Asch, 1956). In each group of participants, an individual believed that they were surrounded by other participants who had received the same instruction they did. All participants were presented the task of identifying which line from a set of lines matched a target line. Each participant was required to state their answer to the task aloud, one after another, with the only true participant answering next to last. Despite the overtness of the correct answer, Asch (1956) found approximately 30% of participants would conform to the wrong answer. Without the influence of peers, less than 1% of participants gave the incorrect answer.

Social conformity emerges from a heightened awareness of social evaluation which influences the behavior of children and adolescents (Somerville, 2013). In a study intended to further evaluate the impact of age on conformity, Walker and Andrade (1996) confirmed that conformity occurs at higher rates in younger age groups as compared to older counterparts. Researchers suggested that this may be due to younger children following peers when they do not understand a task or because they are less confident in their answers given their explorative developmental state (Walker & Andrade, 1996).

The notion of behaving as a crowd behaves in response to a stimulus or task is not unfamiliar to students. If the majority of students in the class are following rules that are conducive

to learning, it is more likely that a typically disruptive student will also behave similarly. For example, when the school bell rings, students will clear the halls and head to class, or students will rise from their seats to leave class, often without any active awareness regarding the amount of time spent in the class period or the current time of day. Similarly, when transitioning, teachers are providing a simultaneous stimulus to the class. If the majority of students respond as desired, other students will be more likely to conform and respond similarly, which can increase the probability of them engaging in desired behaviors and enhancing their academic success (Vecchione & Schwartz, 2022).

Temporal Cues

Temporal cues have been used to occasion a variety of different behaviors. For example, Derr and Shapiro (1989) found overtly displaying a stopwatch enhanced students reading speed during oral reading fluency assessment. Researchers investigating explicit timing also have shown that providing verbal temporal cues (e.g., indicating how much time is left for work) can enhance students' independent seat work (Rhymer et al. 1999; Skinner et al., 1996). The presence of repeated temporal cues (e.g., repeated verbal indications of time left for a task) can establish structure for students with poor time management and can reduce time that is spent off-task (Derr & Shapiro, 1989). When the CWS is implemented, researchers typically provide two verbal temporal cues. First, when they indicate that the color wheel will be turning to red in 2-min and the second cue when they indicate it will be turning to red in the 30-s. As the rules for red typically require students to have put away all materials, be seated, and be looking at the teacher, these cues successfully stop students' current activity so that they can attend to instructions for the next activity. Thus, these temporal cues allow students to respond to the visual cue or rule changes when the color wheel is turned and make transitional periods

explicit. Through the integration of visual and verbal cues, the CWS addresses the difficulties that students may have with recognizing when a transition is occurring and expectations during and after transition.

Purpose of the Study

The Color Wheel system has been used to effectively target desired and undesired behavior across various settings and populations; however, there are no empirical evaluations of the effectiveness of the CWS as a standalone intervention for reducing teacher repeated directions. The current study was designed to evaluate the effectiveness of the CWS in decreasing repeated teacher directions. Repeated teacher directions were targeted to further investigate the contextual validity of the CWS and increase teacher buy-in. This study will also add to the evidence-base regarding how useful the CWS is for teachers and their students. To our knowledge, only an A-B case study has been conducted to examine the effects of the CWS on repeated teacher directions.

Additionally, this study was designed to evaluate the effectiveness of the CWS in increasing in-seat behavior for individual students through implementing CWS procedures in a general education classroom. Previously conducted empirical evaluations of student-level outcomes, including in-seat behavior, of the CWS are limited. Student-level outcomes need to be evaluated due to a lack of research supporting the effectiveness of many common classroom management techniques on an individual level, notably for students with behavioral concerns (Moore et al., 2022). In-seat behavior was targeted due to the students being described as distractible and hyperactive by the teacher.

Research Questions

This study was designed to evaluate the effectiveness of the CWS at reducing teacher repeated directions in a general education classroom. This study also was designed to

simultaneously evaluate the effects of the CWS on the in-seat behavior of individual students within a general education first-grade classroom. Additionally, teacher and student perceptions of the CWS were collected using a brief acceptability survey.

Chapter II

Methodology

Participants and Setting

This study was conducted in a rural first-grade elementary school classroom in the Southeastern United States. The school served approximately 603 students in grades preK-5 (71% Caucasian students, 18% African American students, 6% Hispanic students, and 5% of other ethnic backgrounds). The teacher provided demographic and additional information about herself and her participating students, including but not limited to sex, race, previous behavioral concerns, and eligibility placement. The classroom included 19 students, 13 male-presenting and 6 female-presenting, ages 6 and 7 years; 16 were Caucasian, 2 were Bi-racial, and 1 was Hispanic American. Of the 19 students, consent was obtained for 15 students (see Appendix G for parental consent form). Of the 15 students for whom consent was collected, assent was obtained for 13 students who were 7 years of age (see Appendix H for student assent form). The students for whom consent or assent was not obtained still participated in the CWS; however, behavior and acceptability data were not collected from them. Student participants from which behavioral data was collected were nominated by their teacher due to a perceived high occurrence of disruptive behavior including hyperactivity and distractibility. The three target students were all male-presenting, 2 of 3 target students were younger than 7 years old at the time data collection began, and 2 of 3 target students had a diagnosis of attention-deficit/hyperactivity disorder as reported by their parents to the teacher.

The general education first-grade classroom teacher had approximately nine years of teaching experience and a Master's degree in Literacy and Second Language Studies. The classroom was arranged in five groups of four student desks (or a large table with no more than

four student seats), with approximately three feet separating one group from the next. The front of the room contained open space for the teacher to use when teaching, student sitting areas marked by names on the floor, a white board, a SmartBoard, and the teacher's desk. One side of the room had bulletin boards with classroom activity information posted on the wall and storage spaces while the other had bulletin boards, an additional table, and the computer cart. The back of the classroom contained shelves and storage spaces.

Due to the ongoing COVID-19 pandemic, students and staff were required to wear masks during the school day throughout the first phase of data collection (baseline). Masks were no longer required in the following 3 phases (intervention, withdrawal, and reimplementation), and the participating teacher and most students stopped wearing masks.

CWS Materials

Researchers created a large color wheel by cutting out two identical circles with 24-in diameters from white poster board. One of the circles was divided into thirds then colored with one-third red, one-third yellow, and one-third green. From the other uncolored circle, researchers cut out a wedge approximating one-third of the circle. Overlaying the white circle with the removed wedge on the tri-colored circle, researchers attached both circles together through the middle to allow the white piece to turn and reveal each of the colors individually. This color wheel was created to be hung on the white board at the front of the classroom, from the teacher's desk, or in another fully visible location. Placement was to be decided by the teacher given that it was fully visible to all students during implementation of the CWS. Researchers provided three large poster boards (one red, one yellow, and one green) titled with the corresponding color and the word "rules" for the teacher to use to print the corresponding color's rules that the teacher and researchers previously decided upon. These posters were hung next to one another,

preferably near the color wheel, where they were fully visible to all students upon implementation of the CWS.

Independent Variable

The primary independent variable was a classroom management intervention called the Color Wheel System (CWS). This system implements three sets of rules, each set color-coded as either red, yellow, or green. For this classroom, the rules implemented were made to be common and simple, similar to rules successfully used by past researchers (Blondin et al., 2012; Fudge et al., 2008; Kirk et al., 2010). The red rules were (a) no talking and no noises, (b) no raising hands, (c) eyes on teacher, (d) in-seat or crisscross on floor, and (e) keep hands and feet to self. The yellow rules were (a) follow teacher directions, (b) hands and feet to self / calm body, (c) eyes on speaker or work, and (d) raise hand before speaking. The green rules were (a) level 1 voice, (b) calm body, (c) keep hands and feet to self, and (d) no name-calling or inappropriate language. These rules were decided upon through collaboration between the teacher and the primary researcher to best fit the classroom's population and needs. It should be noted the teacher decided to remove "in-seat or crisscross on the floor" from the yellow rule set in which it is typically included. These rules also incorporated classroom-specific language (e.g., "calm body" for hands to self and sitting still, "level 1 voice" for the use of an inside or talking voice) that had been previously established by the teacher. The CWS provided a set of rules to be used for transitions and two other sets of rules for different activity types. Red rules were only to be used when stopping one activity and transitioning to another, yellow rules were to be used during most academic activities, and green rules were to be used for free time and other social activities. Before changing the color of the wheel to facilitate a transition between activities, the teacher provided both a 2-min warning and a 30-s warning. When changing the color of the wheel, the teacher alone would physically rotate the wheel to reveal the

next color. After turning the wheel to the new color, the teacher would deliver directions or begin the new activity.

Research Design and Dependent Variable

A withdrawal design was used to evaluate the impact of the CWS on the rate of repeated directions from the teacher in a general education first-grade classroom and to evaluate the effectiveness of the CWS at increasing in-seat behavior for three target students. This study contained four phases: baseline, intervention, withdrawal, and reimplementation. The initial baseline phase lasted six sessions (i.e., one observational session conducted in a single school day), the first implementation phase lasted five sessions, the withdrawal phase lasted five sessions, and the reimplementation phase lasted five sessions.

This intervention was implemented to address two dependent variables related to classroom behavior during a transition between two subjects (i.e., transition from Mathematics to English / Language Arts). Data were collected during 20-min observational sessions occurring between approximately 8:50 and 9:10 a.m. (when classroom instruction typically transitioned between two subjects). Specifically, momentary time sampling was used to measure students' in-seat behavior and frequency recording was used to measure teacher repeated directions within a 20-min interval (see Appendix B for data collection sheets). Since in-seat behavior occurs over a duration of time while repeated directions are brief and occur repeatedly throughout a session, researchers recorded data on data collection sheets constructed by researchers using momentary time sampling with 10-s intervals (i.e., 120 total intervals per session) and frequency recording over a 20-min interval.

The operational definition of repeated teacher directions was defined as the teacher verbally or physically delivering a direction or instruction to the class or an individual student more than once (Saecker et al., 2008). These repeated directions must be similar enough in content that they

target the same desired student behavior (e.g., working on a set of problems, getting out book, starting worksheet) to be considered a repetition of the same direction. These repeated directions must occur in response to one or more student(s) asking for clarification, asking for repetition of the instructions, being off-task, or requiring redirection. Repeated directions were not recorded if the teacher repeated the same direction more than once without student prompting either verbally (e.g., asks for information again) or non-verbally (e.g., being oriented toward the wrong page) to avoid recording typical and intentional instructional strategies. Repeated directions from the teacher were quantified using frequency recording within the 20-min observation (with each repeated direction scored only once at the end of the stated direction). Repeated directions were recorded only once if the teacher repeated the same direction or instruction with a pause of less than 5-s between the directions or instructions (e.g., “grab your book, grab your book, grab your book”) directed at the class or same individual student. These frequency data were converted to rate data (i.e., repeated directions per minute observed for each session) by dividing the number of occurrences by the 20-min time span.

The operational definition of in-seat behavior was defined as the student having his or her buttocks, knee, or leg on the top of the seat of their assigned chair or sitting in place during an activity that required them to work on the carpet or floor (Saudargas & Fellers, 1986). Students were not counted as in-seat if they were seated in an inappropriate area (e.g., someone else’s seat, the floor when they were supposed to be at their desk). Momentary time sampling procedures were used to code students’ in-seat behavior for each 10-s interval, meaning an interval was only scored as being in-seat if the student currently was observed as being in their seat at the end of the interval. In-seat behavior was coded for each target student individually and simultaneously (i.e., for each interval, researchers coded in-seat or out-of-seat behavior for all 3 students). For each

observational session, in-seat behavior was reported for each student as percentage of intervals scored during the observational session that the student was coded as being in seat. An average percentage across target students was reported as well.

These two behaviors were targeted given the common challenges that students with behavioral concerns face within the classroom (i.e., lower academic success which worsens over time; Hayling et al., 2008), typical undesired classroom behavior (i.e., disruptive behavior, off-task behavior), and amount of time spent on transition due to repeating directions (Saecker et al., 2008).

Procedures

Baseline Phase

Preceding baseline data collection, researchers conducted classroom observations to gather anecdotal information, practice scoring procedures, and decrease the potential effect that having two unknown adults in the classroom may have on class behavior. During baseline, typical classroom procedures were implemented by the teacher, which included a general set of classroom rules and a loosely implemented token economy. There was a school-wide token economy in place as well. The teacher indicated not enjoying implementing the class wide token economy due to the resource cost (i.e., time, materials) of the strategy. Data were collected for each target students' in-seat behavior and teacher's repeated directions over six 20-min sessions in the targeted time during this phase.

Training of Teacher

Following baseline and before implementing the intervention, the researcher trained the teacher on the CWS procedures (see Appendix A) while students were not present in the classroom. The teacher was provided a summary of research supporting the CWS and an

overview of procedures for implementing the CWS. During one 20-min session, the researcher assisted the teacher in developing each list of behavioral expectations. Then, the teacher was provided the prepared color wheel and the three sets of rules which were posted on the whiteboard at the front of the classroom at the start of the two subsequent training sessions. Within these training sessions, the researcher and teacher worked together to practice implementing the CWS. The researcher demonstrated to the teacher how to change the color wheel, how to announce the 2-min and 30-s warnings, how to use red for transitions between activities, and described what activities were appropriate for the other two colors. The researcher described how the teacher should provide students positive feedback when they followed the indicated set of rules and demonstrated examples of verbal praise. The researcher then implemented a role-playing activity in which the researcher took the role of the class while the teacher practiced implementing the CWS. The researcher supplemented this practice with discussion of potential questions, challenges, and scenarios that could occur in the classroom when using the CWS and provided immediate feedback to the teacher throughout.

At the end of each training session, the color wheel was taken down. On the first day of the intervention, the researcher met with the teacher before students arrived to review the CWS procedures and answer any final questions that the teacher had before the intervention phase was implemented. The color wheel and the three sets of rules were posted on the whiteboard at the front of the classroom before their review session and before students arrived for the day.

Intervention

The intervention phase began the day of the final review of the CWS procedures with the participating teacher. The color wheel and the three sets of rules remained posted on the whiteboard at the front of the classroom before the students arrived. To introduce the CWS to

students, the researcher verbally explained the process of the color wheel, asked students to read the rules and model examples, and modeled the use of the color wheel. The teacher practiced transitions with the class and the researcher assisted as needed (e.g., modeling behavior response to the CWS for the teacher, answering questions). After the explanation, the intervention was installed and data were collected for the first session of the intervention phase.

During this phase, the CWS was implemented by the teacher throughout the entire day. Data were collected over five 20-min sessions in the targeted time during this phase. Additionally, the researcher collected treatment integrity data by recording the teacher's implementation of the CWS (see Appendix C for treatment integrity recording sheet).

Withdrawal

During the withdrawal phase, the teacher was asked to return to the typical classroom procedures that were used during baseline and avoid using any of the CWS procedures or rules. The color wheel and three sets of rules were removed from the front of the classroom before students arrived for the first day of this phase. The teacher was instructed to tell students that they were going to try to have class without using the color wheel if any student questioned why the intervention was not occurring. Data were collected over five 20-min sessions in the targeted time during this phase.

Reimplementation of Intervention

Following the withdrawal phase, the color wheel materials were re-posted at the front of the classroom before the students arrived for the day. When class began, the teacher informed the students that they would be using the CWS procedures once again and reviewed the rules and procedures with them. Consistent with the initial intervention phase, the CWS was implemented throughout the entire day. Data were collected over five 20-min sessions during this phase.

Additionally, the researcher collected treatment integrity data by recording the teacher's implementation of the CWS (see Appendix C for treatment integrity recording sheet).

Teacher and Student Acceptability

After the last session of the study, the primary researcher returned to collect social validity data. During their morning break, the researcher read aloud the student acceptability measure consisting of 9-items on a scale with 4 response options: 1 (Disagree), 2 (Slightly Disagree), 3 (Slightly Agree), and 4 (Agree), similar to the Likert-type scale developed by Fudge et al. (2008; see Appendix E). Students circled their responses while following along with the researcher. After going through the scale as a class, the primary researcher went to each table to answer any questions. Any students who did not have consent to participate in the study were directed to sit at a table at the front of the room and complete an alternative activity the teacher provided.

The teacher was given an acceptability measure consisting of 10 items on a 6-point Likert-type scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree), similar to the one developed by Fudge et al. (2008) and previously implemented by Watson et al. (2016; Appendix D). The teacher completed this scale while the primary researcher went over the student acceptability measure with the class.

Data Analysis

Following data collection for each session, researchers plotted the calculated percentage of intervals that were scored as in-seat for each target student, as well as the average across target students, on time-series graphs. Data on teacher's rate of repeated directions were also plotted on a time-series graph after each session. During the study, phase-change decisions were made based on visual analysis of the average in-seat behavior graph to limit the impact of variability

between students. Visual analysis procedures included looking for changes in variability, trend, and level within graphed data. Specifically, researchers changed phases based on stability within the trend or level and trends going in appropriate direction, as well as overall amount of variability. Each phase was also limited to the recommended minimum for data points (five points per phase) as to prevent excessive time spent withholding the intervention and contributed to phase-change decisions (Kazdin, 2011). At the completion of the study, visual analysis was used to evaluate the effectiveness of the CWS on both dependent variables. Specifically, adjacent-phase data were compared across levels, trends, and variability. Also, the immediacy of any changes that occurred was analyzed.

Visual analysis was supplemented by percentage of non-overlapping data (PND) effect size analysis to compare adjacent phases (Parker et al., 2011; Scruggs & Mastropieri, 2001). PND was determined to be the most appropriate effect size for the current study due to the focus on behavior promotion and reduction. Additionally, PND is a well-established and frequently used effect size analysis within single-subject design. PND can range from 0% to 100%. Interpretation guidelines are as follows: >70% (effective), 50% to 70% (questionable), and <50% (no observed effect; Scruggs & Mastropieri, 2001). PND has several limitations including sensitivity to outliers, lack of sensitivity to distance between score clusters with no overlapping data points, and no known sampling distribution (Parker et al., 2007).

Interobserver Agreement and Treatment Integrity

To collect interobserver agreement, a primary and secondary researcher simultaneously observed and recorded intervals while next to each other. They each used a vibrating timer, which they synchronized at the start of the session, to indicate the end of each interval. The two researchers stood at an angle that prevented them from being able to see the other's recording throughout the

entire session. This was done for 8 out of 21 sessions (approximately 38% of the total sessions observed), including at least 33% of sessions per phase. Using these recordings, the percentage of interobserver agreement regarding in-seat behavior for each target student was calculated for each session by dividing the number of intervals during which the researchers demonstrated agreements (i.e., point-by-point agreement) by the total number of agreements and disagreements and multiplying by 100. Interobserver agreement across observed sessions for Student 1 averaged approximately 92% across 8 sessions attended, with agreement ranges between 84% and 97%. Interobserver agreement across observed sessions for Student 2 averaged approximately 92% across 6 sessions attended (student was absent due to illness), with agreement ranges between 82% and 97%. Interobserver agreement across observed sessions for Student 3 averaged approximately 94% across 8 sessions attended, with agreement ranges between 89% and 98%. An average percentage of interobserver agreement across target students for each session was also calculated with agreement ranges between 89% and 96%.

Table 2 displays the range and means of interobserver agreement per student per phase. In the baseline phase, average interobserver agreement was 95% for Student 1 (range = 93.3% to 96.6%), 90.8% for Student 2 (range = 90.8%, single session collected due to absences), and 94.1% for Student 3 (range = 93.9% to 94.2%). In intervention phase, average interobserver agreement was 91.3% for Student 1 (range = 89.2% to 93.3%), 97.5% for Student 2 (range = 97.5%, single session collected due to absences), and 92.5% for Student 3 (range = 89.2% to 95.8%). In withdrawal phase, average interobserver agreement was 87.1% for Student 1 (range = 84.2% to 90%), 92.5% for Student 2 (range = 91.7% to 93.3%), and 93.8% for Student 3 (range = 90.8% to 96.7%). In reimplementation phase, average interobserver agreement was 94.8% for

Student 1 (range = 92.5% to 97.1%), 89.5% for Student 2 (range = 82.5% to 96.4%), and 97.4% for Student 3 (range = 96.5% to 98.3%).

The percentage of interobserver agreement regarding teacher repeated directions was calculated for each session and was assessed by dividing the number of agreements per interval (i.e., point-by-point agreement) by the total number of agreements and disagreements and then multiplying by 100. Interobserver agreement for repeated teacher directions observed across sessions averaged approximately 96% across 8 sessions attended, with agreement ranges between 84% and 100%. Additionally, a Person's r correlation coefficient was calculated to assess the relationship between researcher data. Data were found to be positively correlated, $r(6) = .995$, $p < .001$, meaning that between the two researcher's ratings, scores increase and decrease simultaneously (House et al., 1981).

Using a sequential checklist similar to one created by Fudge et al. (2008) and modified by Blondin et al. (2012; see Appendix C), the primary researcher collected treatment integrity data and was able to provide feedback to the teacher regarding the fidelity of the intervention for that session. This was done for 40% of the intervention sessions and for at least 40% of sessions across each intervention phase. On 3 out of the 4 sessions, the teacher implemented the procedures with 100% accuracy. On the remaining session, the data indicated that the teacher implemented 5 out of 6 steps (83.3% accuracy). During this session, the teacher did not provide the class a 30-s warning and provided a 10-s warning instead.

Chapter III

Results

Repeated Teacher Directions

Frequency data collected over a 20-min session were converted to rate data (i.e., repeated directions per minute observed for each session) by dividing the number of occurrences by the 20-min time span. Figure 1 exhibits a time-series graph of the rate of repeated teacher directions that occurred per minute each session. Data in the baseline phase did not demonstrate a clear trend and data ranged from 0.65 to 1.20 repeated directions per minute. Visual analysis of the graph shows an immediate decrease in repeated directions after the intervention was applied. Intervention phase data show less variability than baseline phase data ranging from 0.10 to 0.30 repeated directions per minute. Upon withdrawing the intervention, teacher repeated directions immediately increased and remained higher than during the withdrawal phase. When the CWS intervention was reapplied (i.e., reimplementation phase), there was an immediate decrease in teacher repeated directions. Although there is an increasing trend, it is slight as the reimplementation phase data range from 0.15 to 0.25 repeated directions. Across each phase there is an immediate and consistent change in levels of repeated directions. Thus, these data provide three clear demonstrations of experimental control which suggest that the study was not confounded by threats to internal validity such as history, regression to the mean, and maturation.

Statistical Analysis of the Rate of Repeated Teacher Directions

Table 3 displays PND effect sizes for each dependent variable across adjacent phases. PND for repeated teacher directions was within the effective range (PND=100%) and was

consistent across all adjacent phases. This indicates that there is no overlap in data points across each consecutive phase.

In-Seat Behavior

Momentary time-sampling data were used to calculate percent intervals of in-seat behavior for three target students. Additionally, these data were used to calculate average in-seat behavior across the three target students.

Visual Analysis of Average Student In-Seat Behavior

Figure 2 exhibits a time-series graph of the average percentage of intervals in-seat across three target students. Data in the baseline phase did not demonstrate a clear trend and was variable (range = 33.9% to 96.1% intervals of in-seat behavior). Note, session 2, which had the highest levels of in-seat behavior, may have been an outlier caused by the class engaging in a novel activity. Visual analysis of Figure 2 provides little clear evidence that the CWS intervention increased the in-seat behavior of these three students. When comparing the baseline phase data to the intervention phase data, intervention phase data is less variable (range = 60% to 86.9%). However, all five intervention phase sessions fell within the range of baseline phase data. There are no trends in the intervention phase data. When the intervention was withdrawn there was no immediate change in level and data ranged from 69.1% to 72%. Additionally, there is an increasing trend over the first four withdrawal phase sessions, which is in the opposite direction needed for demonstrating experimental control. When the intervention was re-applied, there is little evidence of an immediate effect (range = 71% to 88.9%). Also, re-implementation phase data demonstrate a decreasing trend, which is the opposite needed for demonstrating experimental control. Thus, visual analysis of these data provide no demonstrations of experimental control.

Statistical Analysis of Average In-seat Behavior

Table 4 displays grand means and standard deviations across phases. Average student data indicates that students displayed in-seat behavior the least during baseline phase (*grand* $X=60.5$, $SD=21.2$) with high variability. Data show there was an increase in student in-seat behavior in the intervention phase (*grand* $X=75.2$, $SD=11.3$); however, subsequent phases (withdrawal and reimplementation) remained at similar percentages to that of the intervention phase (*grand* $X=81.0$, $SD=10.3$; *grand* $X=80.7$, $SD=6.4$). Table 3 displays PND effect sizes for average in-seat behavior across adjacent phases. PND for average in-seat behavior indicated no observed effect (PND=0%) and was consistent across all adjacent phases. This indicates that there is notable overlap in data across phases.

Visual Analysis of Individual Student In-Seat Behavior

Figure 3 exhibits a time-series graph of the percentage of intervals in-seat for Student 1. Visual analysis of Figure 3 provides little clear evidence that the CWS intervention increased the in-seat behavior of this target student. Data in the baseline phase did not demonstrate a clear trend and was highly variable (range = 0% to 99.2% intervals of in-seat behavior). When comparing the baseline phase data to the intervention phase data, intervention phase data is less variable (range = 52.5% to 79.2%). However, intervention data did not rise above several baseline data points. There are no trends in the intervention phase data. When the intervention was withdrawn there was an immediate decrease in level but that was followed by a large increase with three subsequent data points above intervention levels. Withdrawal data are variable (range = 34.2% to 87.1%). When the intervention was re-applied, Student 1 demonstrated the highest occurrence of in-seat behavior (100%). There are no trends in

reimplementation phase data. Reimplementation phase data are variable (range = 64.2% to 100%). Thus, visual analysis of these data provides no demonstrations of experimental control.

Figure 4 exhibits a time-series graph of the percentage of intervals in-seat for Student 2. It should be noted that Student 2 was absent for one out of six baseline sessions and 3 out of 5 intervention sessions. Visual analysis of Figure 4 provides little clear evidence that the CWS intervention increased the in-seat behavior of this target student. Data in the baseline phase demonstrated a decreasing trend following the student's initial return to school (range = 43.3% to 89.2% intervals of in-seat behavior). When comparing the baseline phase data to the intervention phase data, there is evidence of an immediate effect and intervention phase data is less variable (range = 91.7% to 97.5%). There are no trends in the intervention phase data given the limited number of data points. When the intervention was withdrawn, there was an immediate decrease in level followed by an increasing trend, which is in the opposite direction needed for demonstrating experimental control (range = 57.5% to 98.3%). When the intervention was re-applied, there is no evidence of an immediate effect. The first three sessions of the reimplementation phase demonstrate an increasing trend but reimplementation data remain below that of the withdrawal phase (range = 69.2% to 87.5%). Thus, visual analysis of these data provide no demonstrations of experimental control.

Figure 5 exhibits a time-series graph of the percentage of intervals in-seat for Student 3. It should be noted that Student 3 was absent for one out of six baseline sessions. Visual analysis of Figure 5 provides little clear evidence that the CWS intervention increased the in-seat behavior of this target student. Data in the baseline phase was variable (range = 37.5% to 93.0% intervals of in-seat behavior). When comparing the baseline phase data to the intervention phase data, there is evidence of an immediate effect; however, the majority of intervention phase data

is below baseline phase data level. Intervention phase data is variable with no clear trend (range = 43.3% to 95.8%) When the intervention was withdrawn, there was an immediate increase in level followed by an increasing trend, which is in the opposite direction needed for demonstrating experimental control (range = 83.3% to 94.8%). When the intervention is re-applied, there is a decreasing trend, which is the opposite direction needed for demonstrating experimental control (range = 68.1% to 95%). Thus, visual analysis of these data provides no demonstrations of experimental control.

Statistical Analysis of Individual In-Seat Behavior

Table 4 displays mean and standard deviation data for each student across phases. Data in Table 4 indicate no phase means of in-seat behavior below 50% across the three target students. The lowest phase mean of in-seat behavior was from Student 1 and occurred during baseline. Table 4 shows that all three target students' in-seat behavior increased from baseline to intervention phase, and no student's mean regressed to baseline levels during the withdrawal phase. Across all three target students and all four phases, there was high variability as demonstrated by the standard deviation for each student in each phase. Relative to other phases, Student 1 demonstrated the lowest average of in-seat behavior during baseline phase, and highest during reimplementation phase. Student 1's average in-seat behavior was consistent between intervention phase and withdrawal phase. Relative to other phases, Student 2 demonstrated the lowest average of in-seat behavior during baseline and highest during intervention. Student 2's average in-seat behavior decreased during withdrawal and decreased further during reimplementation. Relative to other phases, Student 3 demonstrated the lowest average of in-seat behavior during baseline and slightly increased in intervention phase. Student 3's average in-seat

behavior increased from intervention to withdrawal phase then decreased from withdrawal to reimplementation phase.

Table 3 displays PND effect sizes for each target student's in-seat behavior across adjacent phases. For Student 1, PND effect sizes indicated there was no observed effect from baseline to intervention phase (PND=0%), intervention to withdrawal phase (PND=10%), and withdrawal to reimplementation phase (PND=20%). For Student 2, PND effect sizes indicated there was no observed effect from baseline to intervention phase (PND=29%), intervention to withdrawal phase (PND=43%), and withdrawal to reimplementation phase (PND=0%). For Student 3, PND effect sizes indicated no observed effect from baseline to intervention phase (PND=10%), intervention to withdrawal phase (PND=0%), and withdrawal to reimplementation phase (PND=10%).

Teacher Acceptability Survey Data Analysis

Acceptability data were collected from the teacher via an acceptability measure consisting of 10 items on a 6-point Likert-type scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree; Appendix D). The teacher indicated a 6 (Strongly Agree) for 8 out of 10 items. On those remaining items, she indicated a 5 (Agree). These two lower-rated items were: (2) most teachers would find the Color Wheel appropriate to deal with classroom behavior and (6) the teacher spent less time disciplining students when using the color wheel. The teacher indicated that transitions were easier when using the CWS, student behavior quickly improved during the CWS, and that she would continue to use the CWS and recommend it to others.

Student Acceptability Survey Data Analysis

Acceptability data were collected from 13 students via an acceptability measure consisting of 9-items on a scale with 4 response options: 1 (Disagree), 2 (Slightly Disagree), 3

(Slightly Agree), and 4 (Agree; Appendix E). These responses were then used to determine an overall Agree (scores of 3 or 4) or Disagree (scores of 1 or 2) rating from each student. Across the 9 items, an average of approximately 11 of 13 participating students reported they agreed with the statement while an average of approximately 2 of 13 indicated they disagreed. The item on which the most students indicated disagreement (5 of 13 participating students) asked if students liked having the color wheel rules posted at the front of the classroom.

Chapter IV

Discussion

The purpose of the current study was to expand the evidence-base for the CWS by focusing on teacher behavior, as well as individual student behavior. The current study was designed to evaluate the effectiveness of the CWS in decreasing teacher repeated directions and increasing the in-seat behavior of target students. Visual and statistical analysis supports meaningful decreases in the rate of teacher repeated directions when the CWS was applied and meaningful increases when the CWS was withdrawn. Thus, the current study provided three demonstrations of experimental control, including two demonstrations of a treatment effect, which suggest that the CWS reduced rates of teacher repeated directions. This study did not provide evidence that the CWS increased students' in-seat behavior.

Implications of Findings

Classroom management procedures are adapted and implemented by teachers within the context of their classrooms; therefore, one component of an effective classroom management system is contextual validity and teacher buy-in. Previous research supports the CWS as an effective classroom management system across various student populations, grade levels, and dependent variables (Aspiranti et al., 2018; Below et al., 2008; Blondin et al., 2012; Choate et al., 2007; Fudge et al., 2007; Fudge et al., 2008). However, evaluation of the impact of the CWS on teacher behavior is limited. Although Saecker et al. (2008) addressed one of the most vital components within the CWS (i.e., the effect on the teacher), researchers were not able to properly evaluate the effects of the CWS on teacher repeated directions. The Saecker et al. (2008) study was limited by its A-B design; thus, no threats to internal validity were controlled. The current study used a withdrawal design and established three demonstrations of experimental

control regarding the effect of the CWS on teacher behavior. Additionally, interobserver agreement was consistently collected.

In the current study, teacher behavior was impacted by the addition and subsequent removal of the CWS. Teacher repeated directions reduced from an average rate of 0.82 per minute during typical classroom procedures to a rate of 0.20 per minute after the CWS was applied. This reduction was notable, especially when put into the context of an entire school day. The decreases in repeated teacher directions means that more time is available for the teacher to use elsewhere, such as additional teaching time. Also, the decrease in repeated directions may indicate that students had also reduced their rate of requesting or requiring repetitions of directions and instructions. This could be due to the teacher being clearer when delivering instructions, reduced distractions while instructions were being delivered, or a better understanding of the rules at any given moment.

While the CWS was being implemented, the participating teacher told researchers she was beginning to shift her mindset and think about transitions several minutes before they occurred due to needing to warn students in advance (i.e., the 2-min and 30-s warnings). She stated that this shift allowed her to deliver clearer directions, as opposed to when she would realize it was time to transition and suddenly make an announcement to the class. With a reduction in the rate of repetition, potential increase in available instructional time, and potential decrease in students requesting repeated directions, the current study further establishes the CWS as a contextually valid classroom management procedure. The potential of less frustration from the teacher, increased clarity in directions, and increased contextual validity is likely to increase teacher buy-in regarding the CWS as a manageable and effective intervention.

Effective classroom management procedures are adaptable, increase organization within the classroom, and make students aware of expectations and routines (Cameron et al., 2005; Emmer & Sabornie, 2015). Many studies have demonstrated the effectiveness of the CWS at increasing desired behavior (e.g., on task) and decreasing undesired behavior (e.g., inappropriate vocalizations, out of seat) on a class wide level (Aspiranti et al., 2018; Fudge et al., 2007; Kirk et al., 2010; Watson et al., 2016). Previous studies that addressed the impact of the CWS on individual student behavior (including students identified by the teacher as having behavioral concerns) are limited (Blondin et al., 2012; Fudge et al., 2008). To address this gap in the research, the current study's purpose was to evaluate the effect of the CWS on student in-seat behavior for three teacher-nominated target students. The three target students were nominated by their teacher due to need in the classroom including perceived high occurrence of disruptive behavior including hyperactivity and distractibility.

Visual and statistical analysis do not indicate that the CWS increased in-seat behavior across the three target students. There are several reasons why in-seat behavior may have been an inappropriate dependent variable for the current study. The initial range of the students' baseline percentages was 0 to 99.2%, indicating that student in-seat behavior was extremely variable from the onset of the study. On average, students were in-seat approximately 63% of the time during baseline. These high levels of variability make it difficult to detect effects. Also, in-seat behavior across a limited and consistent time span (i.e., same time each morning, relatively same activities) including transition time may not provide a good sample of student behavior throughout the day. Finally, in-seat behavior, as operationally defined in this study, may not have been an appropriate behavior to target in this classroom. The classroom had several areas for students to work at (e.g., student desks, assigned floor seats, cushions, stools, Adirondack chairs

in reading area). While students were scored as in seat if they were in an appropriate area and sitting, students would often be visiting other desks, working throughout the room, or standing/laying down while working. Though the teacher explicitly stated students should be sitting, not doing so appeared to be socially acceptable as the teacher rarely prompted students to return to their seats and students were able to complete their work while out-of-seat, indicating the behavior was not incompatible with their work. However, the teacher was often observed prompting students (having the students review the rules when they were not raising their hands when on yellow, reminding them of the color when they would call out on red, or reminding them to look at the rules when they would be off-task during any color) when they engaged in behaviors that violated other classroom rules. Additionally, the teacher removed “in-seat or crisscross on the floor” from the yellow rule set when collaborating with the researcher to create the rule sets, indicating that she may not perceive that expectation to be necessary for academic work. Thus, although the CWS provides clear expectations for students to remain in their seats, these expectations were not supported by incidental teacher behavior. Additionally, the teacher reported she had noticed students were remaining on-task more often than they had when the CWS was not in place. She reported that despite seeing them out of their seats, they were still oriented towards appropriate tasks and that differed from previous behavior. This further suggests that this study measured an inappropriate dependent variable for this classroom. Additionally, it suggests that on-task behavior may have been a more appropriate dependent variable for this classroom.

To ensure high rates of treatment integrity, the primary researcher completed a sequential checklist (Appendix C) during 40% of all intervention sessions. Data show high treatment integrity throughout implementation. Observations were made of students supporting CWS

procedures as well. On several occasions, students were observed telling their peers what color the class was currently on or correcting them when they broke a rule (e.g., a student whispering to his seat neighbor, “stop calling out, we are on red.”). There also was an occasion where a student reminded the teacher she needed to change the color of the wheel. These observations indicate that students were also aware of the CWS procedures and expectations.

To further investigate the validity of the CWS in the classroom, teacher and student acceptability data were collected. Teacher acceptability data suggests that the teacher found the CWS to be highly acceptable and effective in her classroom (Appendix D). On one item (2) stating, “most teachers would find the Color Wheel appropriate to deal with classroom behavior,” the teacher indicated a 5 (Agree) rather than a 6 (Strongly Agree). Even with a relatively lower rating on this item, the participating teacher had told several other teachers about the CWS and how it was improving her classroom. A teacher in the school who was not participating in the current study approached the primary researcher about implementing the CWS in her classroom and stated that the participating teacher had spoken to her about the CWS. Student acceptability data suggests the majority of students found the CWS to be acceptable and to have expectation more clear within their classroom. Additionally, researchers recorded several students expressing both preference and dislike of the CWS. For example, upon withdrawing the CWS, several students asked where the wheel was during their first independent activity that morning. One student excitedly said, “yay, thank you!” when the teacher informed the class they were simply not going to use it that day. Following that student and one other calling out in excitement, another student sighed and told the teacher with exasperation, “oh no, everyone is just going to follow green rules no matter what today.” On the first day of reimplementation, when the teacher picked up the color wheel from where it had been posted at the front of the

room, several students clapped their hands and one student asked if they had to follow the rules again.

Limitations and Future Research

There were several limitations in the current study that could be addressed by future researchers. As in-seat behavior may have been an inappropriate dependent variable for this context, researchers should conduct similar studies in classrooms where in-seat behavior is expected and valued by the teacher, or re-define in-seat behavior so that it better suits the context of the study's targeted classroom. Also, researchers should evaluate the importance of teachers prompting rules violations, as failure to prompt in-seat behavior may have influenced these results.

Researchers who continue to evaluate the effects of the CWS on individual students should analyze baseline data to determine target behaviors that are appropriate for the classroom and student population being considered. Additionally, future researchers could use baseline or pre-experimental data to identify behaviors that occur at lower levels (e.g., occur less frequently) that may allow for detection of CWS effects. Continuing to evaluate the effects of the CWS on students with varying behavioral needs could further establish the CWS as a classroom management system that is impactful on a student level.

In the current study, repeated teacher directions were recorded as frequency data over a 20-min interval. This allowed for researchers to establish an overall rate of occurrence for repeated teacher directions while collecting additional student behavior data. Future researchers may focus on further establishing the effects of the CWS on repeated teacher directions by using teacher behavior as their only dependent variable. Researchers may also adjust data collection

techniques and use partial interval time sampling across shorter intervals to more accurately reflect the rate of occurrence.

Although the CWS was implemented throughout the entirety of the day, researchers in the current study collected data at a predetermined time for each session (i.e., a 20-min period in the morning, spanning mostly consistent activities and a transitional period). While this was done to limit the potential impact of environmental factors (e.g., time of day, activity, additional teachers or TA, etc.) on the ability to draw cause and effect conclusions, this is also a limitation. Future researchers should evaluate any potential differences in effect across classroom activities, time, or following outside transitions such as extracurriculars or class changes.

The CWS is a classroom management procedure with several components that may influence its efficacy. Future research should examine the components of the CWS including but not limited to the use of a wheel, verbal temporal warnings, practicing the rules, posting the rules, and teacher praise. This analysis may allow researchers to determine ways to simplify implementation further, as previous researchers suggested the CWS is effective even when treatment integrity is not consistent (Saecker et al., 2008; Watson et al., 2016). Additionally, future researchers could focus on the rules included within the rule sets to evaluate if there is variation in the effect of the CWS dependent on what rules are being used. This could also be expanded to evaluate positive-opposite language (i.e., what behavior a student should be doing) versus limiting language (i.e., what a student should not be doing).

Prior to beginning the current study, the teacher was given a consent form (Appendix F) which denotes the data that would be collected from the teacher and their students. Therefore, a limitation of the current study is potential teacher reactivity. Given the teacher's awareness of the behavior that was being measured, it is possible that the teacher adjusted her behavior in the

researchers' presence. To limit this effect, researchers did not discuss any data with the teacher and spent substantial time in the classroom before and after the implementation of the study. Future researchers could conduct studies focused on teacher behavior with several teacher behaviors identified and collect data without telling participating teachers which of those behaviors were being evaluated until after the study is complete (i.e., single-blind studies).

On several occasions throughout the withdrawal phase, the teacher mentioned being eager to return to using the CWS. On the final day of the withdrawal phase, researchers entered the classroom and found that the teacher had posted the wheel and rules. Researchers had to remind the teacher there was one final session of withdrawal data collection, which the teacher conceded to and took back down the materials. When the CWS was reimplemented, the teacher stated she was happy to be using it again and would continue to use it through the end of the school year and the next. Due to this exchange, future researchers should also consider limiting the withdrawal phase to the minimum number of sessions that is suggested for best practice to reduce teacher frustration.

We recognize several limitations regarding the acceptability measures implemented in the current study. The measures used to collect acceptability data have never been evaluated (e.g., no reliability or validity data). Additionally, the teacher and student responses may have been influenced by their desire to please the researchers. Also, we cannot be sure students understood each item or response. Future researchers should consider using a dichotomous scale and picture ratings when working with similar grade-levels.

Conclusion

Results of the current study further support the CWS as an effective, resource-efficient, and contextually valid classroom management system. Teacher behavioral outcomes indicate the

CWS is effective at impacting teacher behavior. Specifically, data suggest the CWS was effective at reducing teacher repeated directions. These findings shift the conversation around classroom management away from student outcomes alone and seek to address teacher perception of, reaction to, and frustration with behavior management in the classroom. Increasing teacher buy-in for classroom management techniques will continue to allow these strategies to be learned, installed, and maintained. By addressing student-level outcomes, this study evaluated the impact a class wide classroom management technique could have on the behavior of individual students. Though results were not conclusive, student-level outcomes from classroom management systems such as the CWS should continue to be investigated.

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Appendices

Table 1

Typical CWS Rules

Color	Rules
Red	Stay in your assigned seat Have desk cleared Have eyes on speaker Keep hands and feet to self No talking
Yellow	Raise hand to speak Raise hand to leave seat Eyes on speaker or work Keep hands and feet to self Follow directions
Green	Use inside voice Keep hands and feet to self Respect others / teacher Follow directions

Table 2*Ranges and Averages of Percent of Interobserver Agreement Per Student Across Phases*

	Baseline	Intervention	Withdrawal	Reimplementation
	X	X	X	X
	<i>[Range]</i>	<i>[Range]</i>	<i>[Range]</i>	<i>[Range]</i>
Student 1	95.0	91.3	87.1	94.8
	<i>[93.3-96.6]</i>	<i>[89.2-93.3]</i>	<i>[84.2-90.0]</i>	<i>[92.5-97.1]</i>
Student 2	90.8	97.5	92.5	89.5
	<i>[90.8]</i>	<i>[97.5]</i>	<i>[91.7-93.3]</i>	<i>[82.5-96.4]</i>
Student 3	94.1	92.5	93.8	97.4
	<i>[93.9-94.2]</i>	<i>[89.2-95.8]</i>	<i>[90.8-96.7]</i>	<i>[96.5-98.3]</i>

Table 3*PND Effect Sizes for All Dependent Variables Across Adjacent Phases*

	<u>Baseline</u> <u>To</u> <u>Intervention</u>	<u>Intervention</u> <u>To</u> <u>Withdrawal</u>	<u>Withdrawal</u> <u>To</u> <u>Reimplementation</u>
<u>Repeated Teacher Directions</u>	100%	100%	100%
<u>Average In-Seat Behavior</u>	0%	0%	0%
<u>Student 1</u>	0%	10%	20%
<u>Student 2</u>	29%	43%	0%
<u>Student 3</u>	10%	0%	10%

Table 4*Descriptive Statistics for Percent of Intervals Scored as In-Seat Across Students*

	<u>Baseline</u>	<u>Intervention</u>	<u>Withdrawal</u>	<u>Reimplementation</u>
	X (SD)	X (SD)	X (SD)	X (SD)
	[Range]	[Range]	[Range]	[Range]
<u>Student 1</u>	50.7 (37.2)	70.8 (10.7)	70.4 (24.2)	80.7 (16.8)
	[0-99.2]	[55.2-79.2]	[34.2-88.4]	[70.0-100]
<u>Student 2</u>	69.7 (17.7)	94.6 (4.1)	83.2 (14.6)	79.3 (8.3)
	[43.3-89.2]	[91.7-97.5]	[67.5-98.3]	[69.2-85.0]
<u>Student 3</u>	63.3 (24.0)	71.8 (21.6)	89.3 (5.2)	82.1 (10.9)
	[37.5-93.0]	[43.3-95.8]	[83.3-94.8]	[68.1-95.0]
Grand X (SD)	60.6 (21.3)	75.2 (11.3)	81.0 (10.3)	80.7 (6.4)

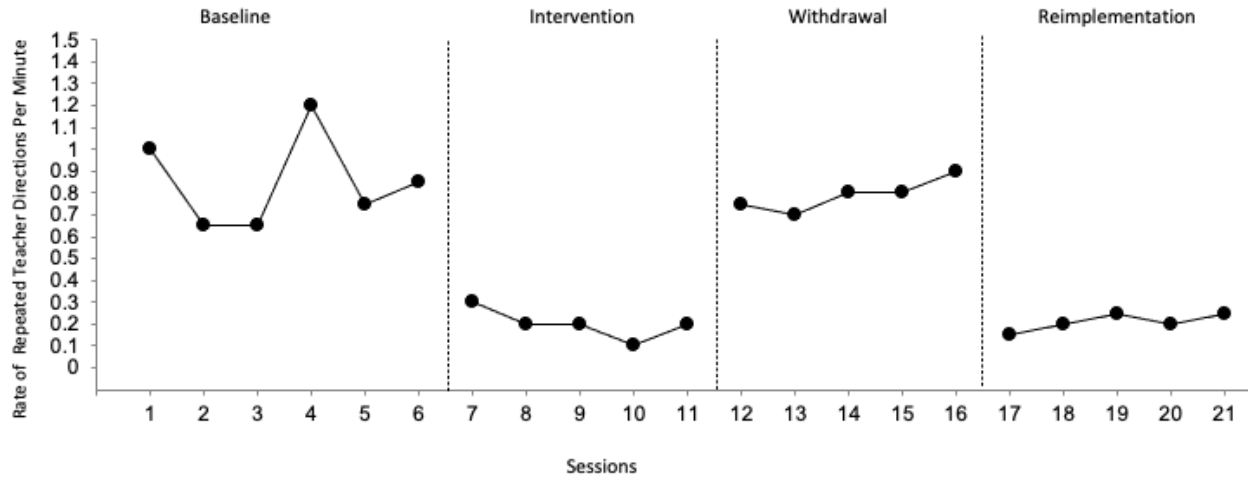


Figure 1

Rate of Repeated Directions within a 20-m Interval

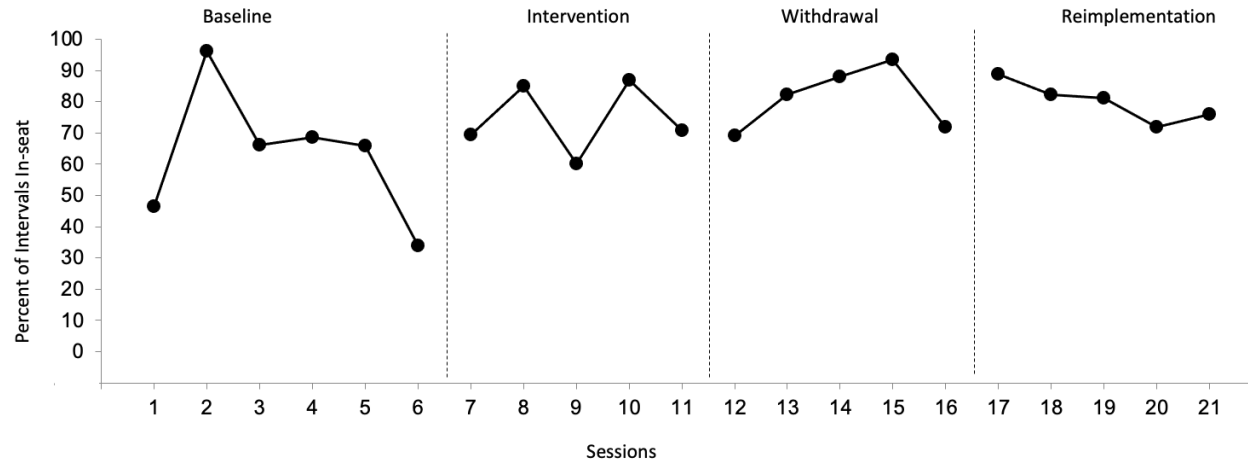


Figure 2

Average Percent of Intervals Scored as In-Seat for all Target Students

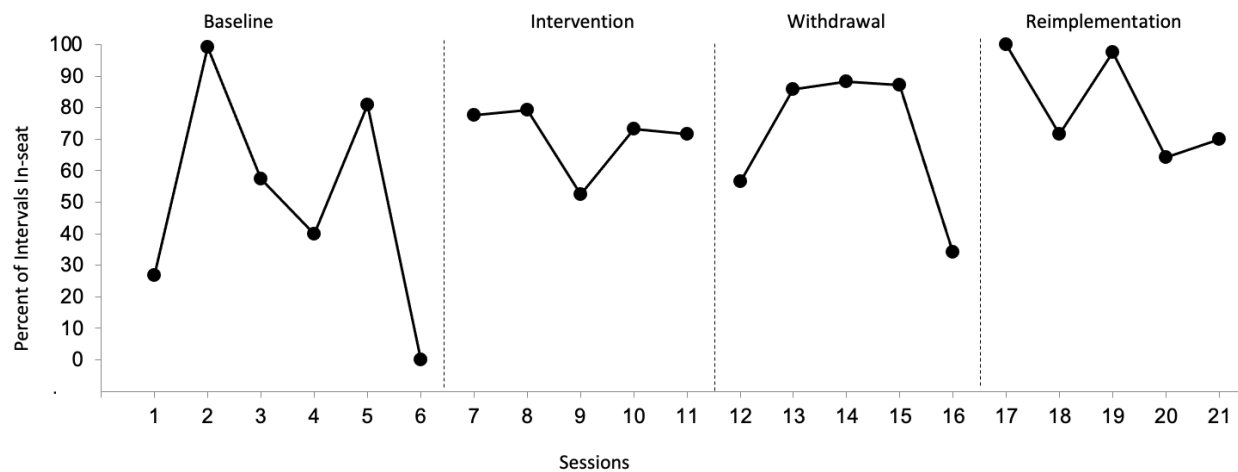


Figure 3

Percent of Intervals Scored as In-Seat for Student 1

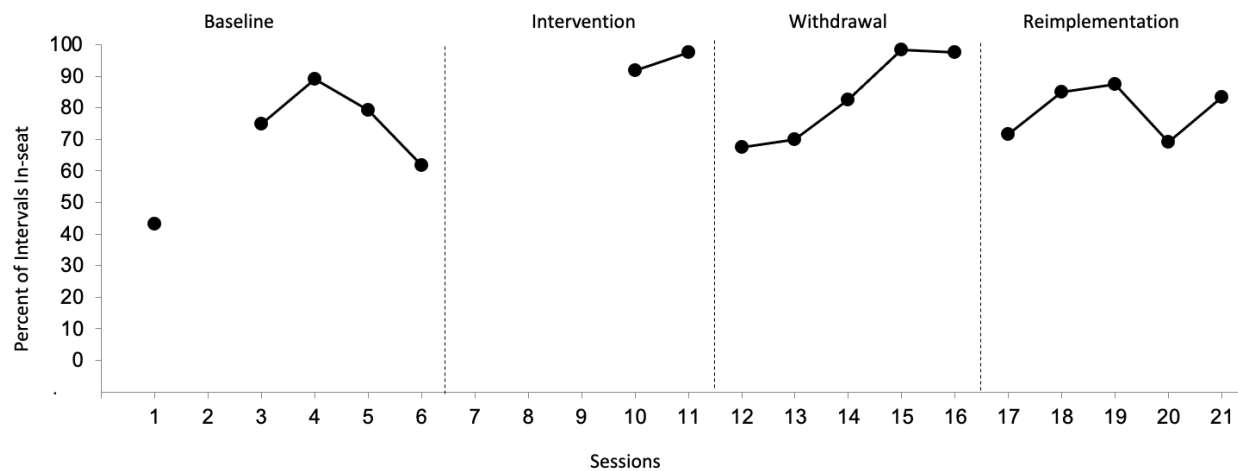


Figure 4

Percent of Intervals Scored as In-Seat for Student 2

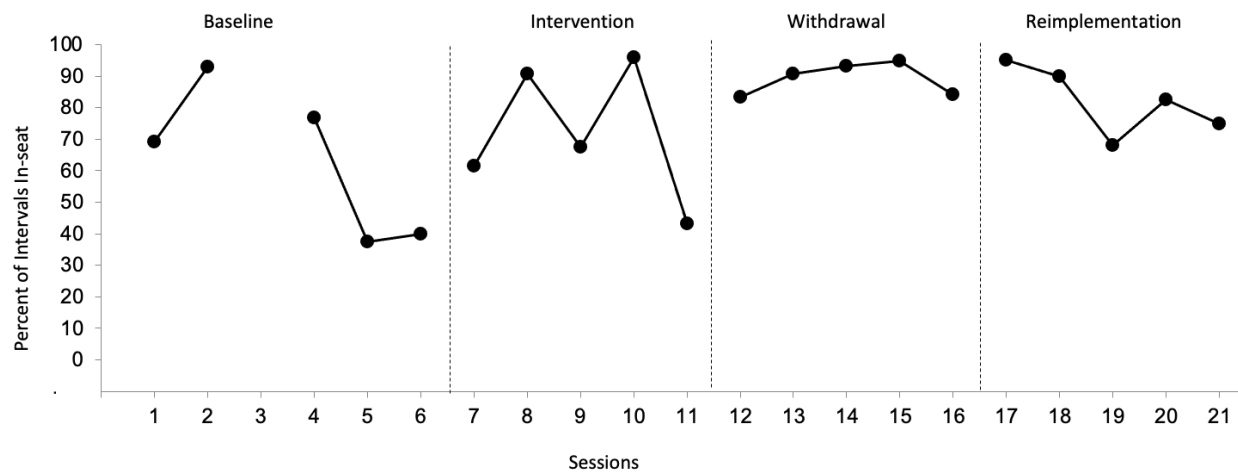


Figure 5

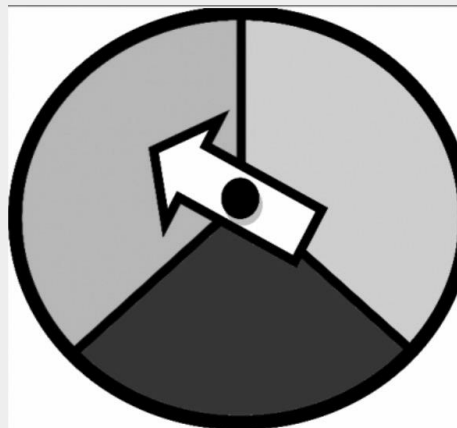
Percent of Intervals Scored as In-Seat for Student 3

Appendix A

Teacher Training Materials

Big pieces of the CWS

- The Color Wheel
- The Rules
 - *Red- transition*
 - *Yellow- academic*
 - *Green- free time*
- Warnings
 - *2 minutes*
 - *30 seconds*
- Praise desired behaviors



- The Color Wheel classroom management system (CWS) standardly consists of 3 sets of rules, each being relevant for use during different situations within the classroom.
- The rules are color-coded (red, yellow, and green) and the indicated corresponding color is used to inform students which set of rules are to be followed during that time.
- Each set of rules were developed to be used for common classroom activities such as large group instruction, small group work, independent work, transitions, and free time.
- Each rule set consists of 3 to 5 behavior-specific rules as opposed to the typical broad list for overall classroom procedures.
- Originally, this system was designed for use within classrooms that served students with EBD (Skinner et al., 2007).

Color Wheel System

Green Behaviors	Yellow Behaviors	Red Behaviors
• Talk in a quiet voice • Keep hands and feet to self • Comply with directions	• To speak, raise hand for teacher permission • To leave seat, raise hand for teacher permission • Look at the speaker or your work • Comply with directions	• Return to your seat • Clear your desk • Look at the teacher • Do not talk

How To: Improve Classroom Management Through Flexible Rules: The Color Wheel. Response to Intervention, (n.d.).
https://www.interventioncentral.org/classroom_management_color_wheel

How To

- Announce to the class that the activity presently being worked on will cease and the color wheel will go from the color the class is on (yellow or green) to red and the red rules will be in effect.
- Give the 2-minute warning for the change.
- Give the class a 30-second warning.
- Turn color wheel to red.
- Attend to any inappropriate behavior.
- Deliver instruction.
- Turn color wheel from red to either yellow or green.
- Start new activity and follow rules for appropriate color.

04



Practice

Use the mini color wheel in hand!

Now, work with an imaginary class and practice transitioning from YELLOW to RED to GREEN and back from GREEN to RED to YELLOW.

Remember to give appropriate warnings and to review the color wheel rules that are posted!

05

Tips and Tricks

Keep the amount of time that you spend on red brief. Do not teach or provide academic lectures when on red.

After quick directions/instruction on red, turn back to yellow and respond to any raised hands. This allows you to address questions all at once and minimizes repeated questions and wasted time.

Be sure to praise students when they are following the rules. Do not say things like, "Well it is about time you behave!" or "Why haven't you been doing this all along?"

You may use time on green as a group reward (all or none of the students get the time on green).

DO NOT USE RED AS PUNISHMENT.

You, not the students, turn the wheel.

Tips and Tricks

Be sure to explicitly teach the students the rules. Read and recite these rules often, especially when first implementing.

Post the color wheel and written rules in a fully visible location. It helps if they are near one another and near where group directions/instructions are typically given.

When writing the rules, use your own phrasing (e.g., seat-in-seat, folded hands) and make them brief.

Fade warnings, recitations, and praise as the year progresses, but do not stop as you want to keep the rules in the students mind and may need to introduce new students to the system.

Use red frequently. It is useful for almost every transition between activities and will allow you to clearly communicate with the class.

Do not go from yellow to green or vice versa. Always use red as a transition between.

Appendix B

Data Collection Sheets

Observer: _____

Date: _____

Repeated Teacher Directions - Frequency Count (20 minute interval):

In-seat Momentary Time Sampling

√ = in-seat at end of interval X = out of seat at end of interval

Time Intervals	Student 1	Student 2	Student 3	Time Intervals	Student 1	Student 2	Student 3
1				31			
2				32			
3				33			
4				34			
5				35			
6				36			
7				37			
8				38			
9				39			
10				40			
11				41			
12				42			
13				43			
14				44			
15				45			
16				46			
17				47			
18				48			
19				49			
20				50			
21				51			
22				52			
23				53			
24				54			
25				55			
26				56			
27				57			
28				58			
29				59			
30				60			
Totals	__ √ __ X	__ √ __ X	__ √ __ X	Totals	__ √ __ X	__ √ __ X	__ √ __ X
Percentage							

Time Intervals	Student 1	Student 2	Student 3	Time Intervals	Student 1	Student 2	Student 3
61				91			
62				92			
63				93			
64				94			
65				95			
66				96			
67				97			
68				98			
69				99			
70				100			
71				101			
72				102			
73				103			
74				104			
75				105			
76				106			
77				107			
78				108			
79				109			
80				110			
81				111			
82				112			
83				113			
84				114			
85				115			
86				116			
87				117			
88				118			
89				119			
90				120			
Totals	__ √ __ X	__ √ __ X	__ √ __ X	Totals	__ √ __ X	__ √ __ X	__ √ __ X
Percentage							

Appendix C

Treatment Integrity Checklist¹

Date:

Observer:

		Yes	No
1	Announce to the class that the activity presently being worked on will cease and the color wheel will go from the color the class is on (yellow or green) to red and the red rules will be in effect.		
2	Give the class a 2-minute warning for the change.		
3	Give the class a 30-second warning for the change.		
4	Turn color wheel to red.		
5	Deliver instruction.		
6	Turn color wheel from red to either yellow or green.		

Number of steps completed:

Percentage of steps completed:

¹Adapted from Blondin, C., Skinner, C., Parkhurst, J., Wood, A., & Snyder, J. (2012). Enhancing on-task behavior in fourth-grade students using a modified color wheel system. *Journal of Applied School Psychology*, 28, 37-58. doi:10.1080/c15377903.2012.643756

Appendix D

Teacher Acceptability Form Containing Teacher Indicated Responses

Teacher Acceptability Form

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

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly 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 discipling 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 used 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

¹Adapted from Fudge, D., Skinner, C. H., Williams, J., Cowden, D., Clark, J., & Bliss, S. (2008). Increasing on-task behavior in every student in a second-grade classroom during transitions: Validating the color wheel system. *Journal of School Psychology, 46*, 575–592. <https://doi.org/10.1016/j.jsp.2008.06.003>

Appendix E

Student Acceptability Form¹

Directions: Please mark whether you agree or disagree with an item by circling the number.

	DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	AGREE
1. I liked the Color Wheel.	1	2	3	4
2. Using the Color Wheel helped me know which rules to follow.	1	2	3	4
3. The Color Wheel helped me behave better.	1	2	3	4
4. When the Color Wheel was not used I did not know what rules to follow.	1	2	3	4
5. I liked having the rules posted at the front of the class.	1	2	3	4
6. The Color Wheel made going from one activity to the next easier.	1	2	3	4
7. Using different colors for different rules made it easy to know what rules to follow.	1	2	3	4
8. I behaved better when the Color Wheel was used.	1	2	3	4
9. I was able to move between activities without disrupting the class when the color wheel was being used.	1	2	3	4

¹Adapted from Fudge, D., Skinner, C. H., Williams, J., Cowden, D., Clark, J., & Bliss, S. (2008). Increasing on-task behavior in every student in a second-grade classroom during transitions: Validating the color wheel system. *Journal of School Psychology, 46*, 575–592. <https://doi.org/10.1016/j.jsp.2008.06.003>

Appendix F

Teacher Consent for Research Participation

Research Study Title: Implementing the Color Wheel System to Improve Student Behavior during Classroom Activities)

Researcher(s): Jade Bennett, B.S., University of Tennessee, Knoxville
Tara Moore, Ph.D., University of Tennessee, Knoxville
Chris Skinner, Ph.D., University of Tennessee, Knoxville

Why am I being asked to be in this research study?

We are asking you to be in this research study because we are working with teachers to study the effects of the Color Wheel System, a classroom management procedure, on students' classroom behavior and the amount of time spent in transition due to the need for repeated directions. We are asking you to be in this research study because we believe that you and your students will benefit from this system being put into place within your classroom.

What is this research study about?

The purpose of the research study is to evaluate the effects of the Color Wheel System, a classroom management procedure which is designed to teach students about different types of behaviors which are acceptable during different types of classroom activities (e.g., students are expected to be quiet when listening to teacher instructions, but students are expected to talk quietly when working with other students). Researchers from the University of Tennessee will help you learn to use the Color Wheel System and implement it within your classroom. We anticipate that using the Color Wheel System will help improve behavior for most or all of the students in your class and reduce the amount of time spent in transition between activities. We would like to collect data on individual student's behavior to help us determine if it is an effective and desirable classroom management procedure. We would also like to collect data from you to determine whether or not is effective at reducing the need for repeated directions/instructions to the class. Additionally, we would like to gather information from you and your students to determine if it is manageable and valid within a classroom context.

Who is conducting this research study?

This study is being conducted by researchers at the University of Tennessee, Knoxville. Researchers are professors or doctoral students in school psychology or special education with educational experience and have completed research training requirements and background checks for research through the University.

How long will I be in the research study?

If you give your consent to be in the study, your participation will last for at least one month but may last until the conclusion of this school year.

What will happen if I say “Yes, I want to be in this research study”?

If you give your consent to be in this study, we will collect data and information on you and your students’ behavior during class so that we can compare students’ behavior and efficiency of transitions when the teacher is using the Color Wheel System to times when the teacher is not using the Color Wheel System. A researcher will meet with you to provide a summary of research supporting the CWS and to train you on how to effectively implement the CWS. After being trained on the CWS, you will introduce the CWS and its procedures to your students with researcher assistance as needed. Researchers will visit two to five times each week throughout the duration of the study during the designated time that was determined to be used for data collection. During those visits, we will collect data on students’ classroom behaviors and additional behavioral data from you. Data will also be collected regarding how the procedures are implemented by you, the teacher, when the Color Wheel system is being used. Near the end of the study, we will ask you about your perceptions of the Color Wheel System. In addition, we will also ask you to provide additional relevant information about your students, including demographic information (grade, age, gender, ethnicity), eligibility category, and/or the special education or remedial services being received by the student.

What happens if I say “No, I do not want to be in this research study”?

Being in this study is up to you. You can say no now or leave the study later. If you say “no, I do not want to be in this research study”, we will not collect data in your classroom.

What happens if I say “Yes” but change my mind later?

Even if you decide to be in the study now, you can change your mind and stop at any time.

If you decide to stop before the study is completed, you can let us know by contacting one of the researchers. If you withdraw from the study before data collection is completed, all data will be destroyed and no further data will be collected.

Are there any possible risks to me?

It is possible that someone could find out you were in this study or see your study information, but we believe this risk is small because of the procedures we use to protect your information. These procedures are described later in this form.

Are there any benefits to being in this research study?

Participating in this study will potentially benefit you by helping you to implement a research-based strategy that could improve the behavior of students in your classroom. Even if you do not benefit from being in the study, your participation may help us to learn more about the Color Wheel System to improve student behavior. We hope the knowledge gained from this study will benefit others in the future.

Who can see or use the information collected for this research study?

If information from this study is published or presented at scientific meetings, your name will not be used and we will not disclose personally-identifying information. We will not report the school or any teacher’s name. Instead, we will refer to the research setting as being a classroom in a(n) elementary, intermediate, middle, or high school located in the southeastern United States.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information or what information came from you. Although it is unlikely, there are times when others may need to see the information we collect about you. These include:

- People at the University of Tennessee, Knoxville who oversee research to make sure it is conducted properly.
- Government agencies (such as the Office for Human Research Protections in the U.S. Department of Health and Human Services), and others responsible for watching over the safety, effectiveness, and conduct of the research.
- If a law or court requires us to share the information, we would have to follow that law or final court ruling.

What will happen to my information after this study is over?

We will keep your information to use for possible publication in scientific journals or presentations at scientific meetings. Your name and other information that can directly identify you will be deleted from your research data collected as part of the study. All hard copies of data forms will be stored in a locked file cabinet in the researcher's office on the UTK campus. The electronic database will include your participant number and will be stored on the researcher's strong password-protected, personal document location of the UTK network and only the researchers will know the password to access the files.

What else do I need to know?

If we learn about any new information that may change your mind about you being in the study, we will tell you. If that happens, you may be asked to sign a new consent form.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers. You may contact Jade Bennett at jbennett@utk.edu. You may contact Dr. Tara Moore at 865-974-6459 or by email, tara.moore@utk.edu. You may contact Dr. Chris Skinner at 865-974-8403 or by email, cskinne1@utk.edu.

For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact:

Institutional Review Board
The University of Tennessee, Knoxville
1534 White Avenue
Blount Hall, Room 408
Knoxville, TN 37996-1529
Phone: 865-974-7697
Email: utkirb@utk.edu

STATEMENT OF CONSENT

I have read this form and the research study has been explained to me. I have been given the chance to ask questions and my questions have been answered. If I have more questions, I have been told who to contact. By signing this document, I am agreeing to be in this study. I will receive a copy of this document after I sign it.

Name of Teacher Participant

Signature of Teacher Participant

Date

Appendix G

Permission for Research Participation of a Minor

Research Study Title: Implementing the Color Wheel System to Improve Student Behavior during Classroom Activities

Researcher(s): Jade Bennett, B.S., University of Tennessee, Knoxville
Tara Moore, Ph.D., University of Tennessee, Knoxville
Chris Skinner, Ph.D., University of Tennessee, Knoxville

Why is my child being asked to be in this research study?

We are working with teachers to study the effects of the Color Wheel System, a classroom management procedure, on students' classroom behavior. We are asking your child to be in this research study because we believe that your child and their peers will benefit from this system being put into place within their classroom.

What is this research study about?

The purpose of the research study is to evaluate the effects of the Color Wheel System, a classroom management procedure which is designed to teach students about different types of behaviors which are acceptable during different types of classroom activities (e.g., students are expected to be quiet when listening to teacher instructions, but students are expected to talk quietly when working with other students). Researchers from the University of Tennessee will help your child's teacher learn to use the Color Wheel System. We anticipate that using the Color Wheel System will help improve behavior for most or all of the students in the class. We would like to collect data on individual student's behavior to help us determine if it is an effective and desirable classroom management procedure.

Who is conducting this research study?

This study is being conducted by researchers at the University of Tennessee, Knoxville. Researchers are professors or doctoral students in school psychology or special education with educational experience and have completed research training requirements and background checks for research through the University.

How long will my child be in the research study?

If you give permission for your child to be in the study, and your child agrees, their participation will last for at least one month but may last until the conclusion of this school year.

What will happen if I say "Yes, I want my child to be in this research study"?

If you give permission for your child to be in this study, we will collect data and information on your child's behavior during class so that we can compare students' behavior when the teacher is using the Color Wheel System to times when the teacher is not using the Color Wheel System. Researchers will visit two to five times each week throughout the duration of the study. During those visits, we will collect data on students' classroom behaviors. Near the end of the study, we will ask your child about their perceptions of the Color Wheel System. In addition, we will also ask your child's teacher to provide additional relevant information about your child, including demographic information (grade, age, gender, ethnicity), eligibility category, and/or the special education or remedial services being received by your child.

What happens if I say “No, I do not want my child to be in this research study”?

Your child being in this study is up to you. You can say no now or leave the study later. If you say “no, I do not want my child to be in this research study”, we will not collect data on your child’s classroom behavior. However, your child will still participate in the use of the Color Wheel System since your child’s teacher will use it for all students in the classroom.

What happens if I say “Yes” but change my mind later?

Even if you decide to allow your child to be in the study now, you can change your mind and stop at any time.

If you decide to stop before the study is completed, you can let us know by contacting your child’s teacher. If your child withdraws from the study before data collection is completed, his/her data will be destroyed and no further data will be collected on your child.

Are there any possible risks to my child?

It is possible that someone could find out your child was in this study or see their study information, but we believe this risk is small because of the procedures we use to protect your child’s information. These procedures are described later in this form.

Are there any benefits to being in this research study?

Participating in this study will potentially benefit your child by helping his/her teacher implement a research-based strategy that could improve his/her behavior, and the behavior of other students in the classroom. Even if your child doesn’t benefit from being in the study, their participation may help us to learn more about the Color Wheel System to improve student behavior. We hope the knowledge gained from this study will benefit others in the future.

Who can see or use the information collected for this research study?

We will protect the confidentiality of your child’s information by assigning your child a participant number and removing all potentially-identifying information from all hard copy data forms once data is collected and entered into an electronic database. If information from this study is published or presented at scientific meetings, your child’s name will not be used and we will not disclose personally-identifying information. We will not report the school or teacher name. Instead, we will refer to the research setting as being a classroom in a(n) elementary, intermediate, middle, or high school located in the southeastern United States.

We will make every effort to prevent anyone who is not on the research team from knowing that your child gave us information or what information came from your child. Although it is unlikely, there are times when others may need to see the information we collect about your child. These include:

- People at the University of Tennessee, Knoxville who oversee research to make sure it is conducted properly.
- Government agencies (such as the Office for Human Research Protections in the U.S. Department of Health and Human Services), and others responsible for watching over the safety, effectiveness, and conduct of the research.
- If a law or court requires us to share the information, we would have to follow that law or final court ruling.

What will happen to my child's information after this study is over?

We will keep your child's information to use for possible publication in scientific journals or presentations at scientific meetings. Your child's name and other information that can directly identify them will be deleted from their research data collected as part of the study. All hard copies of data forms will be stored in a locked file cabinet in the researcher's office on the UTK campus. The electronic database will include his/her participant number and will be stored on the researcher's strong password-protected, personal document location of the UTK network, and only the researchers will know the password to access the files.

What else do I need to know?

If we learn about any new information that may change your mind about your child's being in the study, we will tell you. If that happens, you may be asked to sign a new permission form.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers. You may contact Jade Bennett at jbennett@utk.edu. You may contact Dr. Tara Moore at 865-974-6459 or by email, tara.moore@utk.edu. You may contact Dr. Chris Skinner at 865-974-8403 or by email, cskinne1@utk.edu.

For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact:

Institutional Review Board
The University of Tennessee, Knoxville
1534 White Avenue
Blount Hall, Room 408
Knoxville, TN 37996-1529
Phone: 865-974-7697
Email: utkirb@utk.edu

STATEMENT OF PERMISSION

I have read this form and the research study has been explained to me. I have been given the chance to ask questions and my questions have been answered. If I have more questions, I have been told who to contact. By signing this document, I am giving permission for my child to be in this study. I will receive a copy of this document after I sign it.

Child's Name (printed) _____

Parent's Name (printed) _____

Parent's Signature _____ Date _____

I agree to allow my child's teacher to provide relevant academic, demographic, and discipline information from my child's school record.

Parent/Guardian's Signature _____ Date _____

Appendix H

STUDENT ASSENT STATEMENT

(This will be read to the student if the student needs reading support.)

Hello, my name is Jade Bennett. I am a graduate student at the University of Tennessee. I am working with your teacher to help him (or her) use a new procedure called the Color Wheel. Your teacher will use the Color Wheel to help you and the other students in your class learn about different types of behaviors that are appropriate for different types of activities. For example, your teacher may tell you that he (or she) expects students to be silent when he (or she) is giving directions to the entire class. But, your teacher may also tell you that it is acceptable to talk quietly when you are working with a partner on work in your class. Your teacher will use a Color Wheel as a signal to let you know what types of behaviors are allowed during different activities.

Several times each week, I or others from the University of Tennessee will visit your classroom. If you agree to participate in this study, we will gather information on how you are behaving to see if the Color Wheel is a good procedure for teachers to use to help student behavior. We will also ask your teacher for information about you including including your grade, age, gender, ethnicity, eligibility category, and/or the special education or remedial services you participate in. At the end of the study, we will also ask you questions about what you think about the Color Wheel. The study will last at least one month but could last until the end of the school year.

It is possible that someone could find out that you were in this study or see your information, but we believe this risk is small because we will protect your information. Your real name will be removed from any forms or data that is collected. Only a number that is assigned to you will be used to describe you and your school will be described as a(n) elementary, intermediate, middle, or high school “in the Southeastern United States.” Being a part of this study may help you by helping your teacher use a new strategy to get both you and your peers to better behave within the classroom.

Please talk this over with your parents before you decide whether or not to be a part of this study. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say “yes” you can still decide not to do this.

If you don’t want to be in this study, you don’t have to participate. Remember, being in this study is up to you and no one will be upset if you don’t want to participate or even if you change your mind later and want to stop.

You can ask any questions that you have about the study. If you have a question later that you didn’t think of now, you can email me at bennett@utk.edu or ask me next time.

You may also contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Signing your name at the bottom means that you agree to be in this study. You and your parents will be given a copy of this form after you have signed it.

Name of Participant

Date

Signature of Participant: _____

If participant is unable to sign, the researcher should note why assent signature was not acquired and sign below.

Reason for waived assent:

Researcher’s name: _____

Researcher’s signature: _____

Vita

Jade Bennett (née Estes) was born to Marti Estes and Belinda Fuller. She grew up in Rockwell, North Carolina with her mother, Belinda Fuller, older sister, Breeann Cornwell, and younger brother, Triston Fuller. She attended Western Carolina University in Cullowhee, North Carolina for her undergraduate studies. She graduated Cum Laude in December of 2017 with her Bachelor of Science degree in Psychology, with a minor in Biology. Jade married her husband, Austin Bennett, in December of 2017 as well. The following Fall, she began graduate school at the University of Tennessee pursuing her Ph.D. in School Psychology. Jade obtained her Master of Science degree in Applied Behavior Analysis from the University of Tennessee in 2021. Her current research interests include applied behavior interventions, including classroom management interventions. Jade will be completing her pre-doctoral psychology internship with Cypress Fairbanks Independent School District in 2022-2023. She will complete her doctoral degree in 2023.