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Use of the Classroom Management Link System (CMLS) Across Multiple Classrooms

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**Abstract**

The purpose of this study was to determine the effect of the Classroom Management Link System (CMLS) across classrooms using a multiple baseline design. CMLS is a preventive system that uses rule development, self-monitoring, goal setting and increased positive teacher feedback to prevent disruptive classroom behavior and increase academic engaged time. Baseline data on off-task and disruptive behavior was taken in each classroom until CMLS was implemented. CMLS was implemented after three weeks of collecting baseline data in Classroom One and six weeks of collecting baseline data in Classroom Two. Each teacher completed surveys on non-academic factors impacting their classroom and their own classroom management skills. These surveys were completed at the time CMLS was implemented in each classroom as well as at the end of the study. An additional survey was administered at the end of the study to measure the acceptability of the intervention. The results suggest that the intervention had a large effect on off-task behavior and a small to moderate effect on disruptive behavior. Mixed results were found for each of the surveys. Results on the acceptability of the intervention were also mixed.

### **Use of the Classroom Management Link System (CMLS) Across Multiple Classrooms**

With the implementation of the Regular Education Initiative (REI) and the onset of the full inclusion movement, demands on modern teachers have changed drastically. Teachers are now responsible for providing appropriate instruction to children on a wide range of educational levels, as well as managing their classrooms in a manner that is effective for children with a wide variety of needs. Modern classrooms are heterogeneous (Minke, Bear, Deemer, & Griffin, 1996)). Teachers are charged with the task of meeting each of these students' individual needs on a daily basis while providing appropriate educational modifications and a meaningful education to all students (Emmer & Stough, 2001). While the benefits of inclusive education are numerous, this movement clearly changes the demands placed on modern teachers (Fuchs & Fuchs, 1994).

As REI took hold in the United States, the most common criticism was that the majority of teachers lacked the appropriate skills necessary to educate children with disabilities (Minke, Bear, Deemer, & Griffin, 1996) and manage a heterogeneous classroom. A consistent finding in the research is that many teachers feel unprepared to manage difficult classroom behaviors (Wesley & Vocke, 1992). Wesley and Vocke (1992) found that only 37% of teacher education programs at the time included a course in classroom management.

The implications of this sparse training can be far reaching. We know that effective classroom management is a key component for school learning (Wang, Haertel & Walberg, 1993) and that disruptive classroom environments can lead to academic disengagement, which left unaddressed over time increases the likelihood of school dropout (Doll, LeClair, & Kurien, 2009). This occurs because as the student becomes disengaged they are likely to fall behind in school. As they become more frustrated academically, students are less likely to put effort into

learning, ask for help, and try new things (Turner et al., 2002). Increased disengagement can lead to a negative attitude towards education and strained relationships with teachers (Doll et al., 2009). Recent research on contributing factors to low reading, Chiu, McBride-Chang & Lin (2012) found that next to the country of origin (61%), the largest amount of remaining variance (30%) was attributed to the classroom environment in a study that spanned 36 countries and 186,725 students. Thus, classroom factors seem to play a crucial role in academic achievement.

Research has shown that positive student teacher relationships are important for easing the transition to future teachers, successful social interaction with peers, and resilience (Doll et al., 2009). Studies have also shown that children who are likely to drop out of high school show certain at-risk behaviors while in elementary school including excessive absences, inattention, poor work completion, behavioral problems, poor relationships with peers, and low academic achievement (Doll et al., 2009). Effective classroom management practices and positive student-teacher relationships are an important component in lessening the impact of these risk factors (Doll et al., 2009).

Poor classroom management practices also have a negative effect on teachers. Many teachers report that handling discipline problems is the most stressful aspect of teaching, and it has been found that discipline problems are highly correlated with teacher burnout (Brouwers & Tomic, 2000). Brouwers & Tomic (1999) found that persistent discipline problems resulted in teachers having low levels of self-efficacy in regards to their ability to manage their classroom, and teachers with low self-efficacy were then more likely to develop burnout, which lead to further discipline problems. Friedman (1995) analyzed different problem behaviors exhibited by students to determine which was most associated with teacher burnout. It was determined that

male teachers were most affected by inattentiveness while female teachers were most affected by disrespect.

### **Effective Classroom Management**

Classroom management consists of a variety of actions that are taken by teachers to create order in classrooms (Emmer & Stough, 2001). Among other things, this includes establishing classroom rules, consequences, and procedures. Not only must the teacher establish each of these expectations, he or she must also be effective in teaching them to the class and making sure they are implemented every day. Simply creating a list of rules, reviewing them the first day of school, and posting them on a wall is not sufficient to create lasting behavioral changes in students (Emmer & Stough, 2001). Several studies have examined the behaviors correlated with student achievement and have found that teachers' classroom management behaviors were consistently correlated with student achievement, including their ability to monitor the classroom, the way that expectations are communicated, how engaged students are in learning, and the number of disruptions (Emmer & Stough, 2001; Wang, Haertel, & Walberg, 1993).

According to Emmer and Stough (2001) there are two key components to effective classroom management. The first is that it must be proactive not reactive. Classroom rules, routines, and procedures should be well established from the beginning of the year and behavior management techniques should focus on rewarding correct behavior instead of punishing incorrect behavior. The second component of effective classroom management is that students must be explicitly taught the behaviors that are expected of them. This should occur at the beginning of each week and procedures should be reviewed daily for at least the first few weeks of the year. Setting the right tone for classroom order is critical at the beginning of the year

(Doyle, 2006). Additional behaviors that effective classroom managers engage in include regular monitoring of class behavior, providing feedback immediately, maintaining a quick pace during activities, and being consistent with rules (Emmer & Stough, 2001).

As was discussed by Emmer & Stough (2001), classroom management strategies should be proactive. Proactive strategies include those that are designed to intervene prior to a problem behavior occurring by changing the environmental cues that trigger problem behaviors (Kern & Clemens, 2007). In classrooms where reactive strategies are in place, procedures are often directed at punishing undesired behaviors. Kern and Clemens (2007) highlighted several reasons that proactive strategies should be utilized over reactive strategies. First, they noted that when done properly antecedent strategies prevent students from engaging in negative behaviors whereas with reactive strategies teachers are responding after a negative behavior has occurred. Second, antecedent strategies have an almost immediate effect because they aim to remove the factors in the environment that can trigger negative behaviors. Third, antecedent strategies create a more positive environment by shifting the focus away from punitive measures and shifting it towards setting students up for success. As was mentioned in Doll et al. (2009) creating a more positive classroom environment can serve as a protective factor against school dropout.

Effective classroom managers set rules and apply them consistently throughout the year. Doyle (2007) listed several important factors that should be considered when developing rules. First, rules should be concrete and specific. Vague rules are hard to enforce and can create confusion for students. Secondly, rules should be functional. This means that the rules should have a direct relationship to the goals for the classroom, primarily for student learning. Kern and Clemens (2007) also outlined guidelines for rule development. They stated that the number of

rules should not be more than five and that students and teachers should work collaboratively to develop the rules. A third guideline is that rules should always be phrased positively and kept short and simple. Rules should also be posted in the classroom where they can be easily seen by all students at all times. Lastly, students need to be taught the rules and provided with examples of what does and does not meet the classroom expectations.

Developing appropriate rules does little good if teachers are not actively engaged in monitoring the behavior of the students in relation to the rules. Monitoring is a key component of effective classroom management (Emmer & Stough, 2001; Doyle, 2007). Doyle (2007) describes a quality he refers to as “withitness.” Withitness is the ability to notice problematic behaviors immediately and address them quickly. Another important aspect of monitoring is providing regular commentary on behaviors, both positive and negative, that are occurring in the classroom, though he does caution against drawing too much attention to negative behaviors (Doyle, 2007).

Madsen, Becker, and Thomas (1968) found praise for appropriate behaviors to be the most important aspect of effective classroom management. They found that when teachers praise students for positive behaviors, they are more likely to repeat that behavior in the future. Kern and Clemens (2007) recommend that praise should be behavior-specific and that when administering praise teachers should state the name of the child that they are praising followed by a specific description of the positive behavior that was being displayed. Kazdin (1977) found that praise can even have a vicarious effect on other students in the classroom who are more likely to later display the behavior for which they observed another student being praised.

### **Behavioral Interventions**

Though classroom management is largely a teacher driven construct, students play a large role in the failure or success of any classroom management plan. The motivation of students must be taken into account, and students must be willing to assess and alter their own behavior. Self-monitoring (SM) approaches have been used to help students alter their behaviors for over twenty years. SM has been shown to be an effective strategy for increasing students' levels of engagement in academics, decreasing disruptive behaviors, and increasing academic skills (Rock, 2005). Kern and Dunlap (1994) listed additional research-based uses of self-monitoring procedures including off-task behavior, school attendance, and social skills. Studies have shown that by engaging in the act of self-monitoring, students are more likely to show lasting behavioral changes (Kern & Dunlap, 1994).

One major benefit of self-monitoring procedures is that they have been shown to be effective even in the absence of extrinsic motivators, and it is hypothesized that this is because self-monitoring allows individuals to undergo a process of self-evaluation and compare their behaviors to their goals (Sagotsky, Patterson, & Lepper, 1978). Kazdin (1974) found that self-monitoring is more effective when individuals have a performance goal by which to judge their progress. He also found feedback, or regular access to the self-monitoring data, to be an important aspect of self-monitoring programs. Goals have been shown to increase task involvement, provide continuous feedback, and instill a sense of challenge in individuals (Elliot & Harackiewicz, 1994).

Research has repeatedly shown that students with higher self-efficacy are more likely to set difficult goals for themselves (Latham & Locke, 1991; Zimmerman, Bandura, & Martinez-Pons, 1992). Additionally, the more difficult a goal is the higher likelihood of success (Latham & Locke, 1991). Thus goals should be set that are appropriately challenging within each



individual's level of competence. Additionally goals should be specific and descriptive (Latham & Locke, 1991). Vague goals are difficult to judge and thus do not provide a good base for behavior comparisons.

### **Classroom Management Link System (CMLS)**

The Classroom Management Link System (CMLS) was developed as a tool to aid teachers in classroom management. CMLS incorporates research-based classroom management and learning principles designed to prevent disruptive classroom behavior problems as well as promoting a positive learning environment in line with positive behavior support (Sailor, 2005). These key elements including self-recording, goal setting, performance feedback and positive expectation and classroom rule that make up the CMLS are outlined below.

#### **Self-Recording.**

One well-researched and historically effective technique for behavior management is self-monitoring (Broden, Hall, & Mitts, 1971). Self-monitoring includes two processes: observation of one's behavior and recording that behavior (Shapiro & Cole, 1994). Self-monitoring has been shown to be effective in reducing behavioral problems in children (Shapiro & Cole, 1994). Self-monitoring procedures can be used for many disruptive behaviors exhibited by individuals or entire classes. Kern, Dunlap, Childs, and Clarke (1994) evaluated effects of self-monitoring on on-task and disruptive behaviors of a special education class of students with emotional and behavioral problems. For this class, on-task behaviors increased while disruptive behaviors were decreased to near 0% of the observed intervals.

Within the self-monitoring procedure, the self-recording component alone has been used as a successful and powerful intervention technique for students (Maag, Reid, & DiGangi, 1993; Kern and Dunlap, 1994; Rock, 2005). Sagotsky, Patterson, and Lepper (1978) hypothesized that

self-recording results in behavior change without additional contingencies because it evokes a process of self-evaluation and provides feedback allowing comparison of one's actual behavior with a goal or expected performance level. Cooper, Heron, and Heward (2007) expanded on this idea and proposed that self-monitoring is effective because it produces self-evaluative statements that act to either reinforce or punish behavior, and these reactive self-evaluation processes have been found to be stronger when the self-recording device is more evident or conspicuous (Mace & Shea, 1990). Recording devices need to be available for recording the target behavior as it occurs, be easy to use, and not be distracting but rather sufficiently obtrusive so the students are aware of it (Shapiro, Durnan, Post, & Levinson, 2002). Additionally, self-monitoring will be more effective when individuals possess a strong positive or negative valence for the behavior being recorded, have criteria against which to evaluate their performance, and receive performance feedback (Mace & Shea, 1990).

### **Goal Setting.**

Asking students to set goals is an important activity, as goals can serve as the criteria against which students evaluate their performance. In education, goal setting has been shown to be effective in combination with other interventions to increase on-task behaviors and academic productivity (Sagotsky et al., 1978). A meta-analysis of literature by Locke and Latham (1984) concluded that goal setting enhanced task performance by directing the students, regulating efforts, enhancing persistence, and promoting the development of new strategies. Locke and Latham (1984) also recommended effective principles of goal setting: students should be assisted in setting specific, challenging, but attainable goals, and be provided with on-going performance feedback.

Significant and important differences in outcomes have been found between performance goals, in which individuals seek to maintain positive judgments of their ability and avoid negative judgments by seeking to prove, validate, or document their ability and not discredit it, and mastery goals, in which individuals seek to increase their ability to master new tasks (Elliott & Dweck, 1988). This study concluded that when students worked towards performance goals, success was related to their own perceived starting skills or ability, with perceived high skill students achieving more and low ability students displaying helpless behaviors. Both high and low ability students avoided opportunities to increase their skills on tasks that entailed potential public mistakes. However, when working towards mastery goals, children's beliefs about their current skills were irrelevant in determining their achievement behavior, even if mistakes were public. Ames and Archer (1988) also found that when students perceived an emphasis on mastery goals, where the focus is self-improvement rather than social comparison, they had more positive attitudes toward the class and a stronger belief that success follows from one's effort. When the emphasis was on performance goals, where failure is normatively defined, however, students focused on their abilities and attributed failure to lack of ability. Ames and Archer recommended that the goal orientation in the classroom should be towards mastery goals in order to maintain adaptive motivation patterns in students.

#### **Positive Expectations and Rules.**

For effective classroom managers, setting rules describes the expectations and for establishing and maintaining a consistent, safe, and orderly environment (White, Algozzine, Audette, Marr, & Ellis, 2001). Consistency and positive expectations for behavior instruction are the cornerstones of an effective discipline plan (Quinn, Kavale, Mathur, Rutherford, & Forness, 1999; Sugai, Bullis, & Cumblad, 1997). Simply posting rules is insufficient. Effective

teachers ensure that students understand how to comply with the rules by proactively teaching students to perform prosocial behaviors and providing explicit examples of compliance and rule violations (Emmer & Stough, 2001; Walker, Stiller, Severson, Feil, & Golly, 1998). Teachers must then actively monitor their students to ensure correct behavior is being exhibited and provide consistent consequences for correct and incorrect performance of classroom rules (Emmer & Stough, 2001; Walker et al., 1998), as consistent corrections build trust and also provide opportunities for change over time. White et al. (2001) recommended applying consequences consistently using a warm, assertive tone in four observable steps: state the observed behavior, state the violated rule, state the consequence, and offer encouragement to prevent future rule breaks.

#### **Performance Feedback.**

In addition to positively stated rules, explicit behavior instruction, and active monitoring of students, teachers also need to provide performance-based reinforcement with a high ratio of positive reinforcement for rule-following behavior and correction for rule breaks (White et al., 2001). This approach by White et al. was shown to be effective in a study that compared classrooms that followed the model (project group) to classrooms that did not use the approach (comparison group), and the project group demonstrated more positive on-task behaviors and less negative off-task behaviors than the comparison group (Marr, Audette, White, Ellis, & Algozzine, 2002). Performance feedback is important because it allows individuals to evaluate their previous performance relative to a specific goal or standard. Latham and Locke (1991) concluded in their review of the effects of feedback and goals on performance that goals and feedback together are more effective in motivating high performance or improved performance than either one alone.

It is important to note that teacher attention, particularly in the form of verbal praise, has a long history of effectiveness of increasing rates of compliance as any reinforcement for many students (Maag & Katsiyannis, 1999; Madsen, Becker, & Thomas, 1968). For praise to be an effective reinforcer, it should : 1) be contingent on the performance of the behavior; 2) specify the particular components of the praised behavior; 3) be credible; 4) sound believable to the student; 5) provide attributions of effort and ability and ; 6) help the student to better appreciate his/her own work (Brophy, 1981; Rathvon, 1999). .

These key elements were built into the CMLS. In general, the CMLS uses primarily a proactive approach which places emphasis on praising positive or rule-following behaviors, as was suggested by Emmer & Stough (2001) and Kern and Clemens (2007). The teacher develops no more than five rules which are positively phrased and posted for the students to see. The behaviors targeted during implementation of CMLS are picked by the teacher implementing the intervention, thus it is well suited to be adapted to meet the individual needs of each classroom and address the specific stressors of an individual classroom. As was recommended by Kern and Clemens (2007) students in a CMLS classroom are explicitly taught the rules at the start of the intervention and are provided examples of behaviors that are and are not acceptable. Teachers are engaged in regular monitoring and provide frequent behavior-specific feedback to students, an important aspect of classroom management according to Emmer & Sough (2001) and Doyle (2007).

Though teachers are responsible for monitoring and drawing attention to student behavior during CMLS, students engage in a type of self-monitoring referred to as self-recording. Self-monitoring has been shown to be effective in addressing a number of behavioral problems. Students are responsible for graphing their rule-following and rule-breaking behavior (through

the use of colored links – see method section for detail) that they have received on a daily basis, creating a visual depiction of the students' behaviors throughout the week. This is designed to allow students time to evaluate their own behaviors. During CMLS, students' also engage in goal setting which allows them to compare their actual behavior to a desired level of behavior. Students have constant access to feedback via their individual graphs which display their data for the week, and they are assisted by their teachers in setting appropriate daily goals that are meet their individual needs.

In this study, CMLS was implemented in two elementary school classrooms using a multiple baseline design. It is hypothesized that the use of CMLS would decrease the occurrence of off-task and disruptive behavior in the participating classrooms. It is also hypothesized that the teacher's who implement CMLS will each have improved self-efficacy for managing classroom behavioral problems following the implementation of CMLS. Finally, it was hypothesized that the teacher reported behavior problems in each classroom will decrease and the teacher reported student assets in each classroom will increase as an effect of the implementation of CMLS.

## **Method**

### **Participants and Setting**

Three teachers from an urban elementary school in Kansas participated in the study. Volunteers were sought from the entire pool of teachers who taught general education in the elementary school. The volunteers included one teacher each from 3<sup>rd</sup> grade, 4<sup>th</sup>, grade, and 5<sup>th</sup> grade. The 5<sup>th</sup> grade teacher was eventually dropped from the study due to time limitations. She was chosen for removal from the study instead of the other two teachers because the initial baseline data showed very low levels of off-task and disruptive behaviors in her classroom. A

multiple baseline design across subjects was used so the participating teachers/classrooms were randomly assigned to the intervention order using a random number generator. The 4<sup>th</sup> grade teacher implemented the intervention first and the 3<sup>rd</sup> grade teacher second. Prior to beginning data collection, approval was obtained from the University of Kansas Human Subjects Committee Lawrence, and informed consent was obtained from each of the participants.

The two participating teachers were both Caucasian females who taught general education. One participant was 31 years of age, had been teaching for a total of eight years and held a Master's level degree. The other participant was 53 years of age, had been teaching for fourteen years, and held a Bachelor's degree. The school in which the research was conducted utilizes a collaborative model in which most children with special education needs receive their education entirely in the general education setting, thus both participants had experience working with children with special needs.

### **Intervention - Independent Variables**

The Classroom Management Link System (CMLS) is a class-wide behavioral intervention that is designed to be highly adaptable to the needs of individual classrooms. Each participant (teacher) was asked to identify 3-5 classroom rules that they wished to focus on. The links that were utilized were basic math manipulatives that were able to be easily connected to form a chain for each student. The links that were used in this study can be found at online math supply stores. Each participant/teacher was given 6 different colors of links. One color was assigned to represent each of the rules that the teacher desired to decrease, and one color was assigned to represent all rule following behaviors. The participants were given approximately 250 links of the rule following behaviors color and 50 links each of the five other colors. A peg board was created for each classroom with a spot for every child's name in the classroom.

The teachers handed out links and gave feedback or praise when they noticed a child displaying positive or negative behaviors pertaining to the established rules. When giving positive feedback or praise, the teacher was to state the student's name and describe the behavior. When corrective feedback was given the teacher was to state the student's name, what rule had been broken, the color associated with the broken rule, and the behaviors the teacher was expecting from the student. After receiving their links, the students were responsible for hanging the links on their peg.

Every morning, the students considered and then recorded individual goals for the day regarding how many links of each color they wanted to obtain or avoid. In addition, each class set daily classroom goals as well. Each student was in charge of bar-graphing the links they had received at the end of the day using the Student Daily Link Chart that can be seen in Figure 1. Two children from each class were responsible for graphing the whole classroom results using the Whole Class Daily Link Chart that can be seen in Figure 2.

### **Participant training.**

Each participant received approximately one and a half hours of individual training prior to implementing CMLS. The participant was given The Classroom Management Link System Manual (Lee, 2006), a comprehensive step-by-step document that details guidelines for setting up the system, developing the rules to be focused on, orienting the students to the system, implementing the system, and analyzing the data. The first author and the participants reviewed the manual together and discussed what each step of implementation would look like.

During the training sessions, each participant identified the rules that they wanted to focus on. Both participants chose to focus on decreasing off-task behavior, talking out of turn, disrespectful behavior, and inappropriate behavior in the hallways. Each behavior was rephrased



into a positive rule to be followed, becoming “staying on-task,” “staying quiet,” “showing good line behavior,” and “being respectful to others.” The participants also developed operational definitions for each of these positive rules which detailed the behaviors that students were expected to be displaying if they were abiding by each rule. Staying on-task was operationally defined as staying focused, staying seated at your desk and working quietly. Staying quiet was defined as raising your hand to talk and not talking while other people are talking. Showing good line behavior was operationally defined as standing quietly, facing forward, and having your body in control. The operation definition for being respectful to others was to say nice words to people, treat others as you would like to be treated, be a friend, and have a positive attitude.

Following the training sessions, the investigators created posters to hang in each of the classrooms for the teachers and students to reference that specified which rule related to which color and listed the appropriate behaviors that were expected to be observed if each rule was being followed. These posters were provided to participants on the first day of implementation in each classroom. All other necessary materials were provided to each participant at the time of training. This included the links, the peg board, and the graphs. The peg board consisted of a hook for each child to place their links. A photo of one of the peg boards can be seen in Figure 3. Above each hook, the children’s names were printed in large letters with the first letter of the name printed in random colors in order to make it easy for the children to identify their hook from any place in the classroom.

### **Implementation.**

The baseline condition lasted for approximately two weeks. During the baseline intervention, baseline data was collected in both classrooms. The intervention condition was

implemented in Classroom One following the collection of three baseline data points and was implemented in Classroom Two approximately three weeks later. On the first day of implementation in Classroom One, the teacher and the first author explained CMLS to the students. Each rule was reviewed with the class. The students were instructed on the rules and what type of behaviors would earn them each color of link and what behaviors they were expected to display in order to obtain the positive links. The poster was used as a visual aide and was left in the classroom throughout the intervention so that the students and teachers could reference it as necessary.

Following the explanation, each student was given a Student Daily Link Chart and was asked to graph a sample chain of links. The teacher assisted the students in graphing the sample chain to ensure they understood the process. For the first two days of implementation in each classroom, the students did not set individual or class-wide goals because they did not have a reference from which to base their goals. Goal setting began on day three in each classroom.

During the intervention condition the goal was for each teacher/participant to distribute at least one link every ten minutes, with a goal of providing a ratio of eight of the positive links for every one negative link over the course of the day. Each time the teacher handed out a link to a student, they were instructed to give the student very specific feedback. When positive feedback was given with a positive link, the teacher was instructed to say the student's name and describe the positive behavior that earned them the link. When corrective feedback was given with a negative link, the teacher was instructed to say the child's name, the rule that was broken, the color of the link associated with the rule, and the replacement behaviors that the child was expected to display instead of negative behaviors. Students were to hang the links from their peg board immediately after receiving the link. Due to the distraction that this could cause

during a lesson, at times the students were to hold on to the links until they were instructed to place them on their pegs by the teacher.

At the end of each day, two students in each class were in charge of graphing the results for the entire class on the Whole Class Daily Link chart. One student counted the total number of links of each color while the other student completed the bar-graph. After the Whole Class Daily Link chart was filled each of the students retrieved their chain of links from their peg and graphed them using the Student Daily Link Chart. Each morning, the students wrote their individual goals for that day on the back of their Student Daily Link Chart. Students were prompted to either set a goal for the number of positive links they wanted to obtain or they were instructed to set a limit on the number of negative links they wanted to obtain. Some students set multiple goals such as to obtain a certain number of positive links and to avoid a certain color of negative links. The teachers assisted their students in writing appropriate goals that met that student's behavioral needs. The students and teacher then worked together to set goals for the class.

### **Treatment Integrity**

Treatment integrity was assessed by the first author during twenty percent of the data collection sessions during the intervention condition, twice for Classroom One and once for Classroom Two. An observational treatment integrity checklist that included 25 items was used to assess treatment integrity. The treatment integrity checklist can be seen in Figure 4. The first seven items assessed whether or not the materials necessary for implementation were present. The remaining eighteen items assessed whether the teacher and/or students were demonstrating the steps necessary for implementation. For example, one item referred to whether or not the teacher handed the links directly to the child and another item assessed whether the students

were immediately placing the link on their pegs. Some of the items on the checklist were not applicable to each treatment integrity check as they assessed the initial implementation of CMLS in the classroom. A percentage of the items that were successfully being implemented were calculated for each integrity check. Feedback was provided to Teacher One following the first treatment integrity check. The second treatment integrity check occurred at the end of the study, so feedback was not provided to either teacher.

### **Direct Observation**

Data on the rates of on- and off-task behavior was taken by direct observation. On-task behavior was defined as the student's eyes and head being focused on the assigned materials or assigned activity. Conversely, off-task behavior consisted of any behaviors that were incompatible with on-task behavior such as looking away from assigned materials, working on other materials, staring blankly, or engaging in activities that disturbed other students. Data was also collected on disruptive behavior. Disruptive behaviors were defined as talking out of turn, standing when expected to be seated, and creating noises. In order for a disruptive behavior to be counted it had to be considered to interfere with the activity of the student or others around them.

Observational data was collected over the course of three months. Because the school in which the study took place was on a year-round calendar, there were over two weeks during the three month span that the students were not in school. Data was collected approximately twice per week, and a total of fifteen data points for each classroom were collected over fifteen separate days. These data were collected using a twenty second interval recording procedure and was recorded on the Classroom Observation Form as shown in Figure 5. Every twenty seconds, the observer scanned the entire classroom and noted how many students were off-task and/or

engaged in disruptive behavior. This procedure was repeated thirty times until ten minutes elapsed.

The percentage of students engaged in off-task behavior as well as a percentage of students being disruptive was calculated for each day that data was collected. The percentages were calculated by taking the number of students in each interval that were engaged in off-task or disruptive behavior and dividing that number by the number of students present in the classroom at the time. This number was then multiplied by 100 to get a percentage of students who were off-task or a percentage of students displaying disruptive behaviors. The percentage for each of the thirty intervals was then averaged to calculate a total percentage for each day.

Data was collected three times in both classrooms during the initial baseline. After the CMLS intervention was implemented in Classroom One and additional five baseline data points were collected in Classroom Two. After a total of eight baseline data points, the CMLS intervention was implemented in Classroom Two. One data point was thrown out because both classrooms were testing during data collection, and the data did not accurately represent the behavioral norms of the classroom.

All of the data was collected by the first author. Interrater reliability was obtained prior to the start of data collection. A teacher from the school in which the study was to be conducted volunteered to allow interrater reliability data to be collected in her classroom. The first author and another graduate student trained in behavior observation methods each simultaneously recorded ten minutes of off-task and disruptive behavior data using the Classroom Observation Form. The raters were unable to see each other's observation forms. Interrater reliability was calculated by finding the difference between the number of students counted to be off-task by one rater and the number of students counted to be off-task by the other rater. This difference

was then subtracted from the total number of students present during the observation to obtain a number of students that the raters agreed to be on-task or not disruptive. This number of students that the raters agreed upon to be on-task or not disruptive was then divided by the total number of students in the room and multiplied by 100 to obtain a percentage of students that the raters agreed upon.

This procedure was repeated four times prior to collection of baseline data in a separate classroom. For off-task behavior, the raters obtained agreements of 92.82%, 96.15%, 97.16%, and 97.18% for a mean agreement of 95.83%. For disruptive behavior, the raters obtained agreements of 98.21%, 98.97%, 99.74%, and 98.72% for a mean agreement of 98.91%. During the intervention condition, interrater reliability data was collected for 20% of the ten data points that were collected.

During the intervention condition in Classroom One, interrater reliability data was collected once and the mean agreement for off-task behavior was 92.62% and 94.17% for Classroom One and Classroom Two respectively. The mean agreement for disruptive behavior was 100% in Classroom One and 99.58% in Classroom Two. Interrater reliability data was also collected once after the intervention had been implemented in both classrooms. The mean agreement for off-task behavior was 96.2% and 88.33% for Classroom One and Classroom Two respectively. The mean agreement for disruptive behavior was 99.70% in Classroom One and 99.82% in Classroom Two. The high percentages on disruptive behavior were likely due to floor effects as few instances of disruptive behavior were observed in either class during the course of the study.

## **Surveys**

### **The Teacher Manageability Scale (TMS).**

The Teacher Manageability Scale (TMS) was designed to measure teachers' perceived self-effectiveness at handling common classroom behavioral and emotional problems (Safran et al., 1988). It consists of 18 demographic and background questions regarding the teacher's experience and 39 Likert-scale items (1=Easily Managed, 3=Somewhat Difficult to Manage, 5=Cannot be Managed). The 39 Likert-scale items load onto nine factors: Lack of Communication, Task Dependency, Inattention, Cognitive Confusion, Negative Aggressive, Lacks Patience and/or Concentration, Impulsive, Failure Anxiety, and Blaming. The total scale internal reliability for the TMS is .94, which suggests it has good reliability. During this study, TMS was administered to each participant immediately prior to the implementation of CMLS in their individual classroom and following the intervention condition.

#### **Classroom Behavior and Assets Survey—Teacher Version (CBAST).**

The CBAST was completed as a pre- and post- intervention measure of each participant's perception of her students' problem behaviors and their assets. The CBAST was designed to be used regularly as a tool to measure various aspects of classroom environments (Shaftel & Lee, 2005). It consists of 30 Likert-scale items which assess the number of students in a class engaging in behaviors that are considered to be assets to the classroom and 30 Likert-scale items which assess the number of students engaging in problem behaviors. Teachers are asked to rate what proportion of their class engages in the given behaviors (1 = 0 students, 2 = 1-2 students, 3 = a few students, 4 = about  $\frac{1}{4}$  of the class, 5 = about  $\frac{1}{2}$  of the class, 6 = about  $\frac{3}{4}$  of the class, 7 = most of the class, and 8 = all of the class). For the purpose of this study, the primary interest was in any changes that were seen in the number of students engaging in problem behaviors. Thus, the student asset scale was not analyzed as a part of this study. Reliability analysis was conducted on the problem behaviors and assets scales. For the problem behaviors combined, an

alpha coefficient of .98 was found. The student assets scale yielded an alpha coefficient of .96 (Shaftel & Lee, 2005).

### **Treatment Acceptability**

Treatment acceptability was assessed at the end of the intervention condition. Both participants completed the Intervention Rating Profile for Teachers (IRP-15), a shortened version of the Intervention Rating Profile (IRP; Martens, Witt, Elliott, & Darveaux, 1985). The IRP-15 consists of 15 Likert scale items. The items are designed to assess the general acceptability of the intervention with items such as “I would use this intervention in my classroom.” Possible answers range from 1 = strongly disagree to 6 = strongly agree. Higher ratings indicate a higher level of treatment acceptability. Factor analysis of the IRP-15 shows that it yields one general factor and the individual item loadings range from .82 to .95). A Cronbach’s alpha reliability coefficient of .98 was found for the IRP-15.

### **Research Design**

This study utilized a multiple baseline design across subjects. Multiple baseline is a single-subject design, which is utilized to document experimental control that would not be possible through traditional case study methods (Horner et al., 2005). In single-subject designs, data for each participant is compared only to his or her self as each participant is his or her own control (Horner et. al, 2005; Neef, 2009). In this study, baselines for each classroom were established and the independent variable (CMLS) was implemented at different times.

The data collected in each classroom was analyzed by using intrasubject comparisons and intersubject comparisons. Three types of intrasubject comparisons were conducted. Each condition was analyzed independently within itself. The baseline and intervention conditions for each participant were compared to each other. Also, For Classroom Two, the first half of the



baseline data, prior to the intervention being implemented in Classroom One, was compared to the second half of the baseline data, when the intervention was being implemented in Classroom One.

Three types of intersubject comparisons were also conducted. The extent to which the shared baselines were similar was analyzed. The overlap between the condition in which the intervention was being implemented in Classroom One and baseline data was still being collected in Classroom Two was analyzed. Also, data was compared across classrooms when the intervention was being implemented in both classrooms.

## **Results**

### **Treatment Integrity**

Treatment integrity was calculated by the percentage of items from the Integrity Checklist for The Classroom Management Link System that was observed in the classroom during each of the integrity checks. The treatment integrity checklist can be seen in Figure 4. Treatment integrity was assessed once during the CMLS Intervention in each classroom. During the CMLS Intervention in Classroom One, the teacher/participant was observed to have 100% of the necessary materials in place. However, only 78% of the student and teacher behaviors were demonstrated. Behaviors that were not being demonstrated included saying the students name when handing them a link, stating the color of the rule that had been broken, and stating replacement behaviors when handing out a negative link. These behaviors were observed on some occasions when the teacher handed a student a link but not the majority of occasions. Additionally the students were observed to be holding on to their links at their desk. Some student hung their links on their pegs when an appropriate situation presented itself; however, the teacher was not observed to be prompting students to hang their links on their pegs.

During CMLS Intervention in Classroom One on a second occasion, the teacher/participant was observed to have 100% of the necessary materials present in the classroom and readily accessible. The percentage of teacher and student behavioral checklist items that were observed in Classroom One was 88%. The teacher allowed the students immediate opportunities to put their links on their pegs and regularly prompted them to do so during the second integrity check; however, she still did not regularly say the student's name when handing out links or list the color of the rule that was broken when distributing negative links.

In Classroom Two, the teacher/participant was observed to have 100% of the necessary materials in place.. Because the first author was not present when the teacher in Classroom Two introduced the intervention, whether or not several of the items on the checklist were completed could not be observed. Thus some of the items on the checklist were assessed by interviewing the teacher in Classroom Two. Of the teacher and student behaviors items on the checklist, 88% were either observed in the classroom or reported by the teacher during an interview. As in Classroom One, the only items not being completed were the teacher stating the students name while handing out a link and the teacher listing the appropriate replacement behaviors when handing out a negative link.

### **Behavior Observations**

#### **Within conditions.**

The observational data for off-task and disruptive behavior across classrooms can be seen in Figures 6 and 7 respectively. Three baseline data points, ten intervention data points, and one follow-up data point were collected in Classroom One. Data was collected on the percentage of students engaging in off-task behavior as well as the percentage of students engaging in

disruptive behavior. During the baseline condition in Classroom One, the percentage of students engaging in off-task behavior ranged from 12.2% to 28.5% with a median percentage of off-task students of 20.5 ( $SD = 8.17$ ). The acceptable stability range (ASR = highest value  $\times$  .15) for baseline data in Classroom One was between 16.22 and 24.78. Only one data point fell in this range, resulting in a low percent stability of 33.3%. During the intervention condition, the percentage of off-task students ranged from 2.2 to 13.5. The median percentage of students engaging in off-task behavior during the intervention condition was 5.32 ( $SD = 3.1$ ). The ASR for the intervention condition was between 3.29 and 7.35. With seven of ten data points in this range, the percent stability for the intervention condition was 70.0%. One follow-up data point was collected. During the follow-up observation, 4.3% of students were engaged in off-task behavior. An effect size was calculated for the effect that implementation of the intervention had on the percentage of off-task students. The effect size on off-task behavior in Classroom One was 1.79. This is considered a large effect size.

Students were generally observed to be engaging in less disruptive behavior than off-task behavior. The range of students engaged in disruptive behavior during the baseline condition in Classroom One ranged from 0% to 2.7% with a median percentage of disruptive behavior of 0.20 ( $SD = 1.51$ ). There was an ASR of 0.55 to 1.37 for the baseline data. With two of the three baseline data points falling in this range, there was a percent stability of 66.7%. During the intervention condition, disruptive behaviors ranged from 0% to 1.3%. The median percentage of students displaying disruptive behaviors during this condition was 0.17 ( $SD = 0.4$ ). The ASR for the intervention condition was between 0 and 0.37, and 90% of the ten data points fell within this range. At follow-up 0.00% of students were observed displaying disruptive behavior. The effect size on disruptive behavior in Classroom One was 0.46, which is considered a small effect size.

As was previously noted, the percentage of disruptive behavior during baseline was very small. Due to floor effects, a large difference in disruptive behavior was not possible.

In Classroom Two, eight baseline data points, five intervention data points, and one follow-up data point was collected. During the baseline condition, the range of students in Classroom Two engaged in off-task behavior was between 6.30% and 15.80%. The median percentage of students engaged in off-task behavior was 10.3 ( $SD = 2.93$ ). The ASR for the baseline condition was between 7.93 and 12.67. Five of eight data points fell within the ASR for a percent stability of 62.5%. The range of students engaging in off-task behavior during the intervention condition was between 1.8% and 5.1%, with a median percentage of 4.2 ( $SD = 1.3$ ). The ASR for the intervention condition was between 2.27 and 6.13. With four of five data points in the ASR, there was an 80.0% stability for the intervention condition. The percentage of students engaged in off-task behavior at follow-up was 4.2. The effect size on off-task behaviors for Classroom Two was 1.59. This is considered a large effect size.

As in Classroom One, students in Classroom Two generally engaged in lower levels of disruptive behavior. Disruptive behaviors during the baseline condition ranged from 0.2% to 4.4%. The median percentage of disruptive behaviors during baseline was 2.17 ( $SD = 1.44$ ). The ASR for disruptive behavior was between 1.50 and 2.84. Four of eight baseline data points fell within the ASR for a percent stability of 50%. During the intervention condition, disruptive behaviors ranged from 0.2% to 1.3% with a median of 0.62% ( $SD = 0.44$ ). The ASR for the intervention condition was between 0.17 and 1.09. Eighty percent of the intervention condition data points fell within the ASR. The percentage of students engaged in disruptive behaviors at follow-up was 2.4%. In Classroom Two, the effect size on disruptive behaviors was 0.93 which is a moderate effect size.

*Between conditions for each target.* Analysis was conducted between the adjacent conditions for each participant. The first thing that was examined was the difference between the last data point for the baseline condition and the first data point for the intervention condition. This is referred to here as the Level Last/First Data Point (LLF). The LLF for off-task behavior in classroom one was 14.6, suggesting a large decrease in off-task behavior from the last data point taken in the baseline condition and the first data point taken in the intervention condition. The Level Median Difference (LMD), or the difference between the medians for the baseline and intervention conditions, was also calculated. The LMD for off-task behavior in Classroom One was 15.8, which also suggests a large decrease in off-task behavior from baseline to intervention. In looking at each of the data points, only one intervention condition data point overlaps with the range of baseline data points, meaning that there is only a 33% overlap between intervention and baseline data points. Analysis of the trend lines for each condition was also conducted. Analysis of the off-task behavior in Classroom One shows that off-task behavior was decreasing; however the percent stability for the baseline condition was only 33.3% suggesting that this baseline had not stabilized. The intervention condition also showed a decreasing trend.

The LLF for disruptive behavior in Classroom One was 2.70. This number is possibly misleading because the final baseline data point for disruptive behavior was not within the acceptable stability range and was significantly higher than all of the other baseline data points. The LMD for disruptive behavior is 0.03, suggesting a much smaller change. Furthermore, there was a 100% overlap of data points between the two conditions, meaning all of the data points in the intervention condition fell within the baseline range. During the baseline condition, the trend for disruptive behavior was increasing. Again, this was due to the final baseline data point which was much higher than the others. The trend for the intervention condition was flat.

In Classroom Two, the LLF for off-task behavior was 8.67, suggesting a large decrease from the last data point in the baseline condition to the first data point in the intervention condition. The LMD was 6.93 suggesting a large decrease in the medians from baseline to intervention. There was no overlap between the data points in the intervention condition and the baseline condition. All of the intervention condition data points were lower than the lowest baseline data point. The trend lines for both conditions are flat suggesting that across each condition off-task behavior was neither increasing nor decreasing. The trend lines for the two conditions did not overlap.

The LLF for disruptive behavior in Classroom Two was -0.08 as the last data point in the baseline condition was slightly lower than the first data point in the intervention condition. The LMD for disruptive behavior was 1.54 suggesting a slight difference in the medians for the baseline and intervention conditions. The overlap between the two conditions was 100%, the same as it was for disruptive behavior in Classroom Two. The trend lines for the baseline condition suggest that disruptive behavior was decreasing slightly. The trend line for the intervention condition shows a slight increase in disruptive behavior.

***Control conditions for each target.*** For Classroom Two, the baseline condition can be divided into two parts. Part one was the shared baseline in which baseline data was being collected in both Classroom One and Classroom Two. Part two was the portion of baseline after the intervention was implemented in Classroom One. If there were no other factors affecting the levels of off-task and disruptive factors in Classroom Two, it would be expected that the two parts of the baseline would be similar. The Level Last/First Data Point (LLF) and Level Median Baseline Difference (LMBD) were analyzed for the two halves of the baseline condition for Classroom Two. The overlap of data points for each half was also conducted.

For off-task behavior the LLF was 5.9, suggesting a decrease in off-task behavior from the last data point in the first half of the baseline condition to the first data point in the second half of the baseline condition. The comparisons of the medians, however, showed less change. The LMBD for off-task behavior was 0.80, showing little or no change in off-task behavior across the two parts of the baseline condition. There was 100% overlap between the data points from part one to part two. The trend lines show that there was a slightly increasing trend during the first part of the baseline condition, but the trend leveled out and was flat during the second half.

For disruptive behavior, the LLF was -0.80, suggesting little or no difference between the last data point in the first half of the baseline condition to the first data point in the second half of the baseline condition. The LMBD was 0.90, also suggesting little or no change. There was 100% overlap between data points in the first part of the baseline and those in the second part of the baseline. Both halves of the baseline show an overall decreasing trend.

### **Intersubject comparisons**

*Shared baseline analysis.* Three baseline data points were collected in Classroom One. During this condition in Classroom One, baseline data was also being collected in Classroom Two. The differences between the overlapping baseline conditions in the two classrooms was analyzed. The median off-task behavior for Classroom One was 20.5. The median off-task behavior for Classroom Two was 10.70. The difference between the two of 9.8 suggests that there was a higher level of off-task behavior in Classroom One during the initial baseline condition. The variability in the two classrooms was also assessed. There was a higher variability in Classroom One with a standard deviation of 8.17. The standard deviation of 3.25

in Classroom Two is reflective of the more stable baseline that was found in Classroom Two during the within classrooms analysis.

For disruptive behavior, the median for Classroom One was 0.17, and the median for Classroom Two was 2.63. This suggests that there were slightly higher levels of disruptive behavior in Classroom Two than Classroom One. The standard deviations for the two classrooms were similar. The standard deviation for Classroom One was 1.51. The standard deviation for Classroom Two was 1.43.

***Vertical overlap analysis.*** Five data points were collected in each classroom during a condition in which the intervention was being implemented in Classroom One and baseline data was still being collected in Classroom Two. The differences between the medians and standard deviations for each of these conditions were analyzed. During this first half of the intervention condition for Classroom One, the median off-task behavior was 5.93 and the standard deviation was 3.92. For Classroom Two, which was still in the baseline condition, the median off-task behavior was 9.90 and the standard deviation was 2.65. The levels of off-task behavior were lower for the classroom in which the CMLS intervention was being implemented.

For disruptive behavior, in Classroom One during the first half of the intervention condition, the median disruptive behavior was 0.17 and the standard deviation was 0.56. During this same time frame, while baseline data was still being collected in Classroom Two, the median disruptive behavior was 1.73 and the standard deviation was 1.34. Lower levels of disruptive behavior were seen in the classroom in which the intervention was being implemented.

***Post intervention analysis.*** A final analysis was conducted comparing the condition in which the intervention was being implemented in both classrooms. During this condition the median off-task behavior in Classroom One was 5.23 and the median off-task behavior in



Classroom Two was 4.20. The levels of off-task behavior were slightly higher for Classroom One than Classroom Two; however, during the shared baseline analysis, the level of off-task behavior was much higher in Classroom One than in Classroom Two. The standard deviations for off-task behavior in Classroom One and Classroom Two were 1.44 and 1.30 respectively.

For disruptive behavior, the median in Classroom One was 0.17, with a standard deviation of 0.17. The median for Classroom Two was 0.63, with a standard deviation of 0.44. The level of disruptive behavior was slightly higher in Classroom Two; however, this also reflects the pattern shown during the shared baseline condition.

### **The Teacher Manageability Scale (TMS)**

The Teacher Manageability Scale (TMS) low scores suggest more confidence in managing disruptive classroom behaviors while higher scores suggest lower confidence. Safran et. al. (1988) administered the TMS to 182 teachers. The mean ratings from the study are listed in Table 1. Prior to implementing the intervention, the teacher in Classroom One rated her mean ability to handle the nine factors that comprise the TMS as a 1.35. The scores for each of the nine factors are broken down in Table 1. The effects of the CMLS Intervention on the teacher in Classroom One's self-perception of her own ability to manage her classroom were mixed. Her ratings on several factors actually suggested that she had a slightly worse ability to handle certain problems, such as Task Dependency, Lacks Patience and/or Concentration, Cognitive Confusion, and Blaming, but the difference on the pre- and post- ratings for these factors was not large. There was a large difference between pre- and post- ratings on two factors. For Negative Aggressive, Teacher One rated her abilities at pre-intervention as a mean of 1.25. Post-intervention her mean was 2.25. This difference is more than one standard deviation, and this finding suggests that her perception of abilities to handle Negative Aggressive

behaviors became worse over the course of the intervention. Another factor that showed a similar trend was the Impulsive factor. At pre-intervention Teacher One rated her abilities as a mean of 1.00, but at post-intervention she rated her abilities as a mean of 2.00. On the remaining three factors, there appeared to be an improvement in the Teacher One's ability to manage pre- to post- intervention; however, these differences were not large. These factors included Lack of Communication, Inattention, and Failure Anxiety.

The results from teacher in Classroom Two suggest that the intervention had improved her self-efficacy in managing typical classroom management problems. She rated her ability to manage six of the nine factors as better at post-intervention than pre-intervention. On one of the six factors, Lack of Communication, her mean rating of 2.00 was more than one standard deviation lower than her mean rating of 2.70 at pre-intervention. This suggests that there was a large improvement in the perception of her ability to handle problems relating to Lack of Communication. The other five factors showing small improvements were Task Dependency, Negative Aggressive, Cognitive Confusion, Inattention, and Impulsive. There was no change from pre-intervention to post-intervention for Blaming. A slight decrease in Teacher Two's perceived ability to manage Lacks Patience and/or Concentration and Failure Anxiety was seen, but the difference was not large.

### **Classroom Behavior and Assets Survey—Teacher Version (CBAST)**

The Classroom Behavior and Assets Survey – Teacher Version (CBAST) was completed by each participant immediately prior to implementation of CMLS in her classroom and immediately following completion of intervention condition data collection. The CBAST yields a measure of the teacher's perception of problem behaviors and assets for the whole class. Individual results for the problem behavior items can be seen in Table 2. Thirty items assessed

the students' problem behaviors. Ratings were provided on an eight point scale, on which 1 = 0 students, 2 = 1-2 students, 3 = a few students, 4 = about  $\frac{1}{4}$  of the class, 5 = about  $\frac{1}{2}$  of the class, 6 = about  $\frac{3}{4}$  of the class, 7 = most of the class, and 8 = all of the class (Shaftel & Lee, 2005).

On the Problem Behaviors scale, Teacher One reported that twelve of 30 items remained the same at post-intervention. Twelve of 30 items improved (meaning that fewer students in class were emitting these problem behaviors) from pre- to post- intervention. These items included lying, destruction of school property, self-consciousness, being unhappy, being moody, low self-esteem, poor study skills, being unprepared for class, poor quality work, interrupting the teacher, being off-task, impulsivity, and difficulty with transitions. Six of the 30 items were rated as worse following the intervention. These items included teasing or taunting peers, angry outbursts, inappropriate dress for school, tardiness, and taking during class.

The mean rating for problem behaviors in Classroom Two was 2.57 prior to CMLS and 2.20 after CMLS. Ten of 30 problem behaviors were rated as being displayed by fewer students following the intervention, including bullying, stealing, moodiness, disorganization, being unprepared for class, lack of motivation, talking during class, interrupting the teacher, excessive movement, and being able to make transitions smoothly. Only one of the problem behaviors was worse following the intervention. This was destruction of school property. The remaining 19 of 30 items were the same at post-intervention as they were at pre-intervention.

### **Treatment Acceptability**

The Intervention Rating Profile for Teachers (IRP-15) was used to assess treatment acceptability. Each teacher completed the IRP-15 at the end of Condition Two. Higher ratings on the IRP-15 represent higher levels of treatment acceptability. The ratings provided by the two teachers varied. The teacher in Classroom One rated the intervention with a total acceptability

score of 50. The 15 items on the IRP-15 are rated from 1 = Strongly Agree to 6 = Strongly Disagree. The mean rating for the teacher in Classroom One was 3.33, and items were split fairly evenly between disagree, slightly disagree, slightly agree, and agree. The teacher in Classroom Two rated CMLS with an overall acceptability rating of 74. The mean rating for the teacher in Classroom Two was 4.93. The teacher in Classroom Two endorsed that she agreed with the majority of the items and strongly agreed with several items. The teacher in Classroom Two only disagreed with one item which stated that the intervention was similar to interventions that had been previously used in the classroom. The items ratings provided by each teacher can be seen in Table 3.

### **Discussion**

In this study, a multiple baseline design was used to examine the effectiveness of the Classroom Management Link System (CMLS). Data was collected on several variables, including the teachers' perceived self-efficacy in classroom management, the teachers' reports of student problem behaviors and assets, observed off-task behavior, and observed disruptive behavior. Acceptable interrater reliability was established prior to starting baseline data collection and additional interrater reliability was collected during the intervention conditions of the study. Treatment integrity data was collected twice during the study. Both participants were found to have 100% of all materials necessary at each data collection. Treatment integrity data as measured by a checklist for the student and teacher behaviors was 78-88%.

The results of the behavior observation data showed positive effects on off-task behaviors and less robust effects for disruptive behaviors. Analysis within each of the conditions shows, that stability for the baseline conditions was low, particularly for off-task behavior in Classroom One. Because of the large variability of some of the scores and the presence of outliers, the

median was used to compare different conditions. The Level Median Difference (LMD) for both classrooms was large for off-task behavior. Analysis of the individual data points, showed that only one intervention condition data point in Classroom One and zero intervention condition data points in Classroom Two overlap with the baseline data points collected. This suggests that levels of off-task behavior were consistently lower following implementation of CMLS than they were prior to implementation. There was no difference in the LMD for disruptive behavior in Classroom One. The LMD for disruptive behavior in Classroom Two is small; however, the levels of disruptive behavior at baseline were also small. Analysis of the individual data points shows that there is 100% overlap of the intervention data points and the baseline data points.

Analysis of the baseline data collected in Classroom Two shows that there was a 100% overlap of data points in the shared baseline and the second half of the baseline. This suggests that there was no significant change in the behaviors in Classroom Two after the intervention was implemented in Classroom One. Analysis of the shared baseline across participants showed that there were higher levels of off-task behavior in Classroom One initially, and higher levels of disruptive behavior in Classroom Two. This is consistent with the observations of the first author. Following implementation of CMLS in Classroom One, the results of the vertical overlap analysis showed that lower levels of off-task and disruptive behaviors were found in Classroom One. Taken together, these results show that there was an effect on off-task behaviors in each of the classrooms. The mean levels of off-task behavior decreased significantly. There was little or no overlap between baseline and intervention condition data points. No change was noted in Classroom Two when the intervention was implemented in Classroom One, and the off-task rates in Classroom One which were initially higher than those in Classroom Two, were lower than Classroom Two following the implementation of CMLS. The

finding showed a slight decrease in the median levels of disruptive behavior in Classroom Two; however, the data points in the intervention condition overlapped 100% with the baseline data condition.

The Teacher Manageability Survey (TMS) was completed by each participant pre- and post- intervention. It was hypothesized that participants would have higher self-efficacy for managing classroom behavior problems following the implementation of CMLS. Data collected prior to implementation suggests that Teacher One had a very high self-efficacy from the start with mean scores of that were more than one standard deviation below the mean for all but one of the nine scales. Most of the ratings provided by Teacher One suggest that she actually felt that she was less able to manage classroom problems after implementation of CMLS. Most of the ratings for the teacher in Classroom Two suggest a slight improvement in her ability to manage classroom problems. Two of the nine scales showed improvements for both teachers. These scales were Lack of Communication and Inattention. Inattention was a problem that was specifically targeted in each classroom with the development of a rule for staying on-task. Lack of Communication was not specifically targeted. Both teachers reported an increased ability to handle problems such as “avoids involvement,” “is difficult to reach,” and “is socially withdrawn.” Overall the scores on the TMS show mixed results.

Results from the Classroom Behavior and Assets Survey – Teacher Edition (CBAST) were mixed and inconsistent across classrooms. In Classroom One, improvements on ratings of prevalence were seen for twelve of 30 problem behaviors, but six problem behaviors were rated as more prevalent after the intervention. Improvements were especially noted on several externalizing behaviors, such as lying and interrupting the teacher, and internalizing behaviors such as appearing unhappy or moody and having low self-esteem. Improvements were also seen

on several behaviors related to school functioning, such as being off-task and having difficulty transitioning from one activity to another. In Classroom Two, improvements were seen in ten problem behaviors, and only one item in each category was worse following the intervention. Improvements were seen in externalizing behaviors, including talking to peers during class and interrupting the teacher, and internalizing behaviors such as appearing moody and having low self-motivation. A few behaviors related to school functioning also improved, including being disorganized and difficulty transitioning.

Treatment acceptability findings were mixed. There was a 24 point difference between the ratings for Teacher One and Teacher Two. Teacher Two rated the intervention as highly acceptable. It is possible that the much lower rating provided by Teacher One reflects the fact that she is a more experienced teacher who reported stronger classroom management skills at the onset of the study. It is also possible that this rating reflects the fact that the Teacher in Classroom One was implementing CMLS for a much longer period of time due to the fact that she implemented the intervention first.

The results of this study suggest that CMLS has a positive effect on reducing off-task behavior in the classroom. The results of the TMS showed a more positive effect on Teacher Two's self-efficacy, and the CBAST showed improvement in a wider range of student assets and problem behaviors in Classroom Two. The teacher in Classroom Two also reported a much higher treatment acceptability rating on the IRP-15. Though Teacher Two held a more advanced degree than Teacher One, she had less years of teaching experience and reported lower self-efficacy in classroom management prior to the intervention. These findings suggest that the intervention may be more favorably received by teachers with less experience and lower self-efficacies in classroom management.

### **Limitations and Future Research**

During this study, the observed levels of treatment integrity were lower than desired. A professional standard for the level of treatment integrity that is necessary has yet to be established, but studies have shown that higher levels of treatment integrity are associated with more positive outcomes (Noelle, Gresham, & Gansle, 2002; Smith et al., 2007). If this study were to be conducted again it would be advisable for the researcher to spend additional time training the participants on the specific procedures to use during the interventions. Modeling of procedures may be useful as well. Additionally it may be useful to provide the participants with additional information on the research base of the procedures so that they are more knowledgeable of why each component is essential to the intervention.

Interrater reliability data was collected prior to baseline data collection and during implementation. Due to the type of data that was being collected and the nature of collecting data on an entire class at once, it was difficult to determine the most appropriate way to establish interrater reliability. The method that was used, calculating the percentage of students that the raters agreed upon, does not take into account that the two raters could have been marking entirely different students as off-task. For example, in a class of nineteen students, if one rater marked one student as off-task and the other rater marked two students as off-task, they may have agreed on all but one student but they may have disagreed on three students if none of the students counted off-task were the same. The assumption in the calculations is that both raters were counting the same students as off-task each time. In the future, a better system of interrater reliability should be established which more accurately assesses which students each rater is considering to be off-task. It is possible that a different observation form may need to be utilized in order to obtain more reliable data.



As was previously mentioned, very low levels of disruptive behavior was observed in each of the classrooms during baseline and intervention data collection. Part of this may have been due to an excessively strict definition of disruptive behavior on the part of the researcher. Though students were often observed talking or fiddling with objects at his or her desk, it was only counted as disruptive behavior if it appeared to be significantly impacting those in the nearby area. It is possible that the first author's definition may have excluded behaviors that did not appear to be affecting nearby students but actually were.

The way in which participants were recruited for the study may have had an impact on the data. Instead of offering the intervention to teachers' who had expressed frustration with classroom management, the first author recruited participants from the entire general education population. This resulted in participants who were interested in learning new interventions, but it did not necessarily result in having participants who needed extensive intervention in their classroom management skills. The teacher in Classroom One, for instance, rated herself as more than one standard deviation above average in her ability to handle common classroom problems. In the future, research should be aimed at studying the effect that this intervention has on teachers who are experiencing significant difficulties managing their classrooms.

A final limitation that must be considered is the timing of the study. Around the time that the study was moving from initial baseline data collection to the intervention condition, the school as a whole began state-wide testing. Classrooms were engaged in testing preparation for large portions of the day, and many teachers were imposing stricter rules and higher expectations for student behavior. This study should be conducted again earlier in the school year to minimize the effect that high stakes testing might have on student behavior.

It was hypothesized that participants would have higher self-efficacy for classroom management following implementation of CMLS. Both participants showed higher self-efficacy for managing communication problems and inattention problems, but improvements were not consistent found for improvement in managing other types of problems. It was also hypothesized that participants would report fewer problem behaviors and more student assets following implementation. Participants did report more student assets and they also reported fewer students with problems with attention and low achievement. Several problem behavior areas were rated as the same or were worse following implementation. Finally it was hypothesized that lower levels of off-task and disruptive behaviors would be observed during implementation of CMLS compared to baseline data. Large effect sizes for off-task behavior and moderate to small effect sizes for disruptive behavior were found. These findings taken together suggest that the intervention had a significant impact on off-task or inattentive behavior in the classroom and the teacher's perceived self-efficacy at managing these behaviors.

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Table 1.

*Mean TMS Pre-Intervention and Post-Intervention Ratings and TMS norms*

Subscale	Classroom One		Classroom Two		TMS Values from (Safran et al., 1988)	
	Pre	Post	Pre	Post		
Task Dependency	1.30	1.70	2.50	2.10	<i>M</i> =2.51	<i>SD</i> =.61
Negative Aggressive	1.25	2.25	3.13	2.50	<i>M</i> =2.36	<i>SD</i> =.71
Lack of Communication	1.86	1.57	2.70	2.00	<i>M</i> =2.57	<i>SD</i> =.65
Lacks Patience and/or Concentration	1.20	1.60	1.60	2.00	<i>M</i> =2.29	<i>SD</i> =.62
Cognitive Confusion	1.33	1.67	2.33	2.00	<i>M</i> =2.41	<i>SD</i> =.66
Inattention	1.67	1.33	2.33	2.00	<i>M</i> =2.49	<i>SD</i> =.68
Blaming	1.00	1.50	2.00	2.00	<i>M</i> =1.88	<i>SD</i> =.67
Impulsive	1.00	2.00	2.00	1.50	<i>M</i> =2.28	<i>SD</i> =.74
Failure Anxiety	1.50	1.00	1.50	2.00	<i>M</i> =2.03	<i>SD</i> =.66

Table 2.

*CBAST Problem Behaviors as Reported by Participants*

Item	Classroom One		Classroom Two	
	Pre	Post	Pre	Post
Fighting, physical aggression towards others.	1	1	1	1
Bullying, intimidation, threats.	3	3	3	2
Teasing or taunting peers, name calling, put downs.	2	3	3	3
Easily angered or upset, angry outbursts.	2	4	2	2
Theft, stealing.	2	2	2	1
Defiance, noncompliance.	2	4	2	2
Arguing, rudeness, or disrespect to teacher or other adults.	3	3	3	3
Lying.	3	1	2	2
Destruction of school property, misuse of materials.	2	1	1	2
Self-conscious or easily embarrassed.	2	1	2	2
Unhappy, sad, or depressed.	2	1	2	2
Low self-esteem.	2	1	2	2
Moody.	1	1	3	2
Disorganized.	4	4	4	2
Stubborn, sullen, or irritable.	1	1	2	2
Poor study skills or habits.	3	2	3	3
Unprepared for class, no homework, materials missing.	3	2	3	2
Poor quality or sloppy work.	4	3	3	3
Lack of effort or motivation, giving up easily.	3	3	3	2
Excessive absences.	1	1	2	2
Inappropriate dress for school.	1	2	2	2
Poor personal hygiene.	2	2	2	2
Tardiness.	1	2	2	2
Excessive complaining.	1	1	2	2
Talking or socializing with other students during class.	3	6	5	3
Calling out answers or interrupting the teacher.	4	2	4	3
Out of seat, excessive movement.	2	2	3	2
Off-task or inattentive during class time.	4	2	3	3
Impulsivity, acts before thinking.	4	2	3	3
Unable to change activities or make transitions smoothly.	2	1	3	2

*Note.* 1 = 0 students, 2 = 1-2 students, 3 = a few students, 4 = about ¼ of the class, 5 = about ½ of the class, 6 = about ¾ of the class, 7 = most of the class, and 8 = all of the class



Table 3.

Ratings on the Intervention Rating Profile (IRP-15)

Item	Teacher One	Teacher Two
This would be an acceptable intervention for the child's problem behavior.	4	5
Most teachers would find this intervention appropriate for behavior problems in addition to the one described.	5	5
This intervention should prove effective in changing the child's problem behavior.	3	5
I would suggest the use of this intervention to other teachers.	3	5
The child's behavior problem is sever enough to warrant use of this intervention.	3	4
Most teachers would find this intervention suitable for the behavior problem described.	3	5
I would be willing to use this intervention in the classroom setting.	4	5
This intervention would <i>not</i> result in negative side effects for the the child.	5	5
This intervention would be appropriate for a variety of children.	5	6
This intervention is consistent with those I have used in classroom settings.	2	2
The intervention was a fair way to handle the child's problem behavior.	3	5
This intervention is reasonable for the behavior problem described.	4	5
I liked the procedures used in this intervention.	2	6
This intervention was a good way to handle this child's behavior problem.	2	6
Overall, this intervention would be beneficial for the child.	2	5

### Student Daily "Link" Chart

Name: \_\_\_\_\_ Teacher: \_\_\_\_\_ Room# \_\_\_\_\_  
Week beginning: \_\_\_\_\_ Ending: \_\_\_\_\_

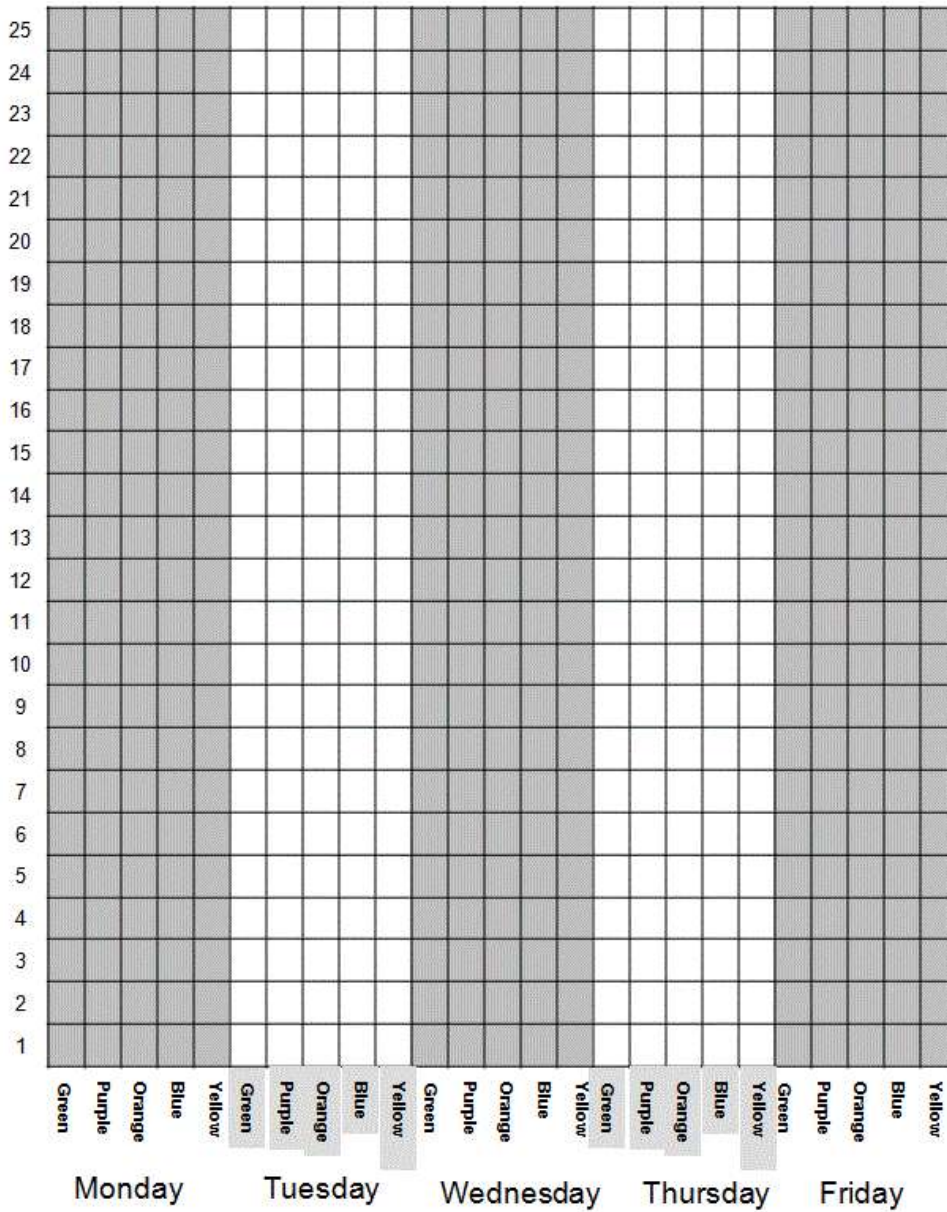


Figure 1. Student Daily "Link" Chart used to Graph Links During CMLS

### Whole Class Daily "Link" Chart

Name: \_\_\_\_\_ Teacher: \_\_\_\_\_ Room # \_\_\_\_\_  
Week beginning: \_\_\_\_\_ Ending: \_\_\_\_\_

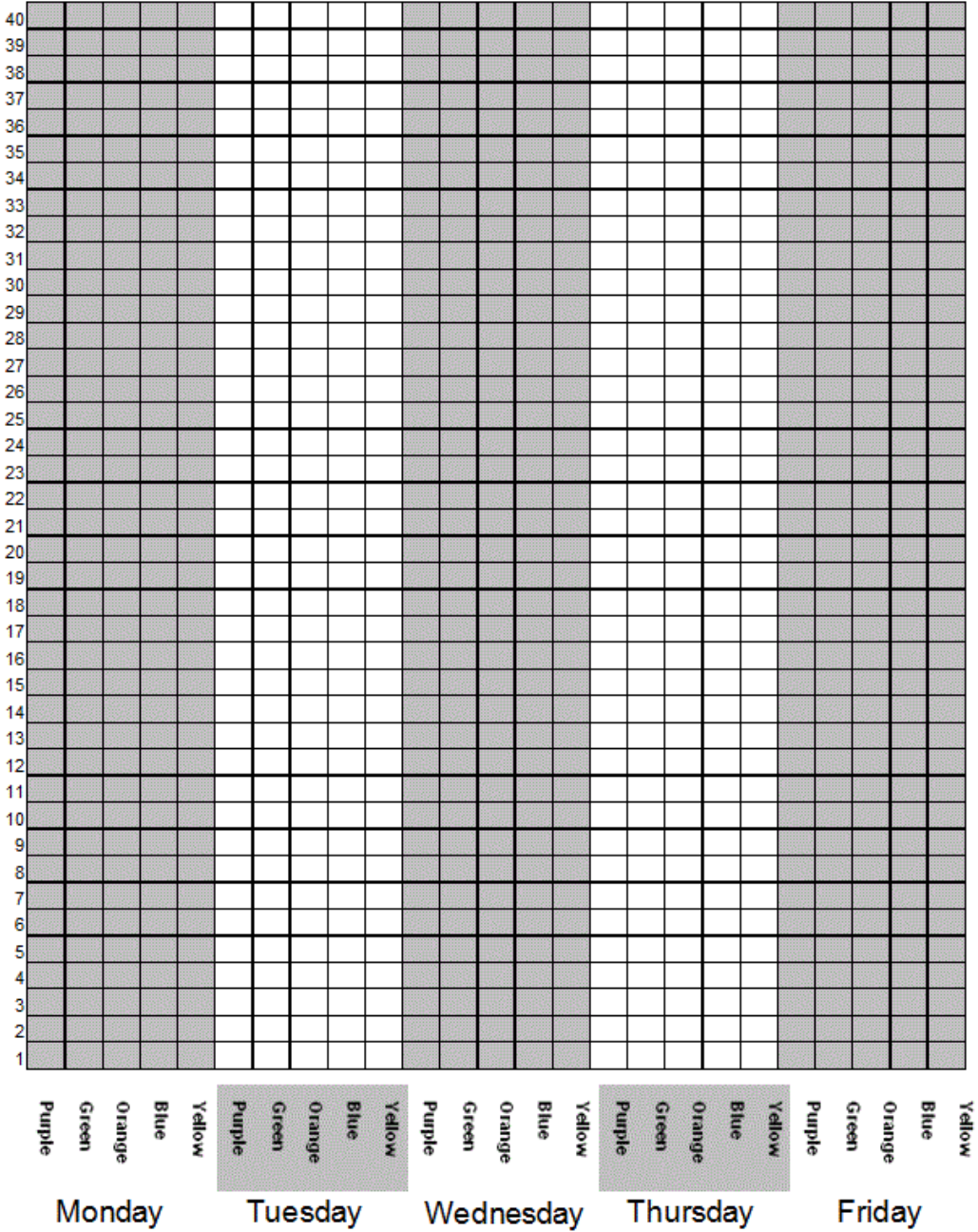


Figure 2. Whole Class Daily "Link" Chart Used to Graph Links During CMLS



Figure 3. A Sample Peg Board for CMLS

## Integrity Checklist for The Classroom Management Link System

Teacher: \_\_\_\_\_

School: \_\_\_\_\_

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

Activity: \_\_\_\_\_

Time: \_\_\_\_\_

Number of students: \_\_\_\_\_

### Environmental-Material Checks

*Survey the classroom for the following materials. If present, place a ✓ on the line. If the material is not present, leave the line blank.*

- ..... 1. Plastic Links in 5 different colors are present.
- ..... 2. Link board with small screw-hooks can be seen.
  - ..... A. Each hook is labeled with each student's name
  - ..... B. The Link board is displayed where easily seen by students.
- ..... 3. The plastic link supply readily accessible (in a bin, pocket, etc)
- ..... 4. Four to Five class rules are prominently displayed
  - ..... A. The rules phrased positively
  - ..... B. The rules include observable behaviors or response classes.
  - ..... C. The rules contain replacement behaviors

\* For example instead of, "Don't talk while others are talking," phrase it, "Listen quietly while someone else is talking."

  - ..... D. Rules written in Link colors
  - ..... E. Rules are posted, perhaps near or above Link board.
- ..... 5. Daily Link Charts are provided to all students for graphing.
- ..... 6. Completed sample graphs are posted.
- ..... 7. Crayons, markers, or pens are available for students to complete graphs.

### Teacher and Student Behaviors

*During a whole class observation, record a ✓ on the blank line on the right, the "Observed" line, if the teacher or student behavior is demonstrated. For behaviors not demonstrated during the observation, conduct an interview with the teacher. Using the items not observed from checklist below, ask the teacher if she is (or the students are) doing the behavior, and then ask her to give an example and demonstration of how it is done. If the behavior is being done correctly and matches the criteria on the checklist, record a ✓ on the left blank line, the "Interview" line. If the behavior was neither observed nor demonstrated during interview, leave the line blank.*

#### Interview / Observed

- ..... 1. The teacher explains to the class that they will be learning a new system to help make a better classroom for everyone.
- ..... 2. The teacher explains that there will be 4 (or 5) new rules to which the class needs to follow and each is color-coded to a link.
- ..... 3. The teacher specifically explains what constitutes compliance versus a rule-break. You may want to ask the children, "What would that look like?" This will



provide guided practice in using the Link system and give the children a more concrete understanding of the rules. The teacher provides the class with lots of demonstrations and reminders of the new rules and opportunities to practice, especially for the first couple of weeks.

- ..... 4. The teacher provides the class with examples of a completed progress chart using either a mock demonstration or a practice day, have the students complete one of their own.
- ..... 5. The teacher explains the method of keeping track of the entire class as well and gives a demonstration or models how to fill out the class-wide progress chart
- ..... 6. The teacher frequently scans the class to assess whether students are following or breaking class rules.
- \_\_\_\_\_ 7. The teacher hands "positive links" on an intermittent basis to students who are following the class rules with a goal of distributing one Link every 10 minutes, keeping a ratio of 4 to 8 positive links to every 1 negative link handed out.
- \_\_\_\_\_ 8. The teacher hands the Links directly to the child.
9. When handing out positive links the teacher states:
- \_\_\_\_\_ A. the student's name
- \_\_\_\_\_ B. the rule the student demonstrated.
- For example, it may sound like, "Good job, Jenny. I like the way you kept your hands to yourself in line."
10. When handing out negative links the teacher states:
- ..... A. the student's name
- ..... B. the rule that was broken
- ..... C. the color of the rule that had been broken
- ..... D. the replacement behavior that is better or is now expected.
- It may sound like, "Jack, you were talking to your neighbor, and that breaks our "red" rule. Remember, everyone needs to be quiet with their eyes on me while I'm speaking."
- ..... 11. Upon receiving a link, the student is responsible for immediately placing the link on her own peg.
- ..... 12. Successive links should be locked together to make a chain on the Link board.
13. At the end of the day (or another designated period), each student should:
- ..... A. count how many links of each color she received and
- ..... B. color in the each bar for which links were obtained on the correct day of the Student Daily Link Chart.
14. At the end of the day (or another designated period), a person (this could be a student who is a "link monitor" or the teacher) should:
- ..... A. count how many links of each color the class received as a whole and;

- ..... B. color in the each bar for which links were obtained on the correct day of the Whole Class Daily Link Chart.
15. On a weekly basis, each student
- ..... A. examines her progress chart to note any trends in her behavior
- ..... B. sets goals for the next week in relation to each rule and for positive links
- ..... C. marks goal lines on a new graph for each rule and for positive links.
- ..... 16. The teacher uses guided questions to help students set specific goals.  
"What rules did you follow best?"; "What rule(s) have you broken the most?", or  
"Do you have more/less of a certain link than yesterday/last week?"
- ..... 17. Teacher examines the completed Whole Class Daily Link Chart and evaluates which rules are being broken the most (or the least).
- ..... 18. Teacher monitors trends in student behaviors for the whole class.
- 
- Not to be checked until second integrity check:
- ..... 19. The teacher changes rules or classroom procedures based on data from the Whole Class Daily Link Chart or the Student Daily Link Chart.

*Figure 4.* The CMLS Treatment Integrity Checklist

### Classroom Observation Form

Date: \_\_\_\_\_ Teacher: \_\_\_\_\_  
 Time: \_\_\_\_\_ Classroom Activity: \_\_\_\_\_

*Circle appropriate Descriptions*

- |                  |                     |                |         |
|------------------|---------------------|----------------|---------|
| Transition       | Middle of Lesson    | Reading        | Math    |
| Independent Work | Beginning of Lesson | Spelling       | Writing |
| Cooperative Work |                     | Social Studies | Film    |

**On-Task behavior:** Student's eyes and head are oriented toward assigned materials and activity.

**Off-Task behavior:** Student's attention (eyes and head) is oriented toward materials other than that which is assigned. Includes working on materials other than that which is assigned, disruptive behavior, as well as "daydreaming."

**Disruptive behavior:** Student is engaging in activity that physically interferes with current activity of self or others. Includes talk-outs, out-of-seat, and requests to go to the bathroom, fiddling with materials creating noise.

**Observations:**

**On/Off Task behavior:** At the beginning of a 20 second interval, select a student to begin a systematic "sweep" of classroom behavior. Record any observed off-task behavior with a tally mark, being certain not to double count any single student. Disruptive behavior may also be counted in this section.

	1	2	3	4	5	6	7	8	9	10
:00										
:20										
:40										
Total:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

**Disruptive behavior:** At the beginning of a 20 second interval, select a student to begin a systematic "sweep" of classroom behavior. Record any observed disruptive behavior with a tally mark, being certain not to double count any single student. *Off-task behavior is NOT included in this count.*

	1	2	3	4	5	6	7	8	9	10
:00										
:20										
:40										
Total:	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Figure 5. Classroom Observation Form Used to Observe Off-Task and Disruptive Behaviors



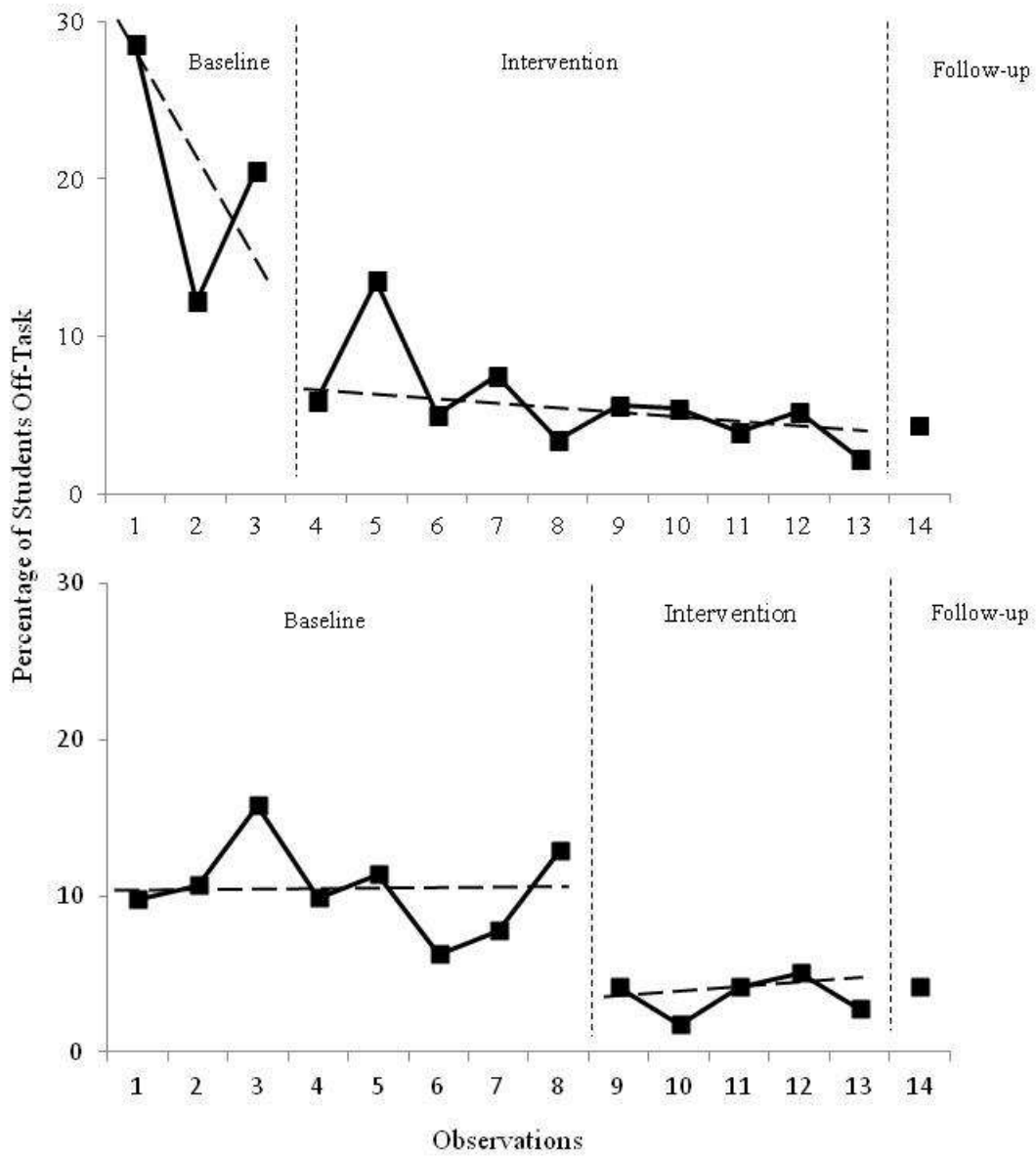


Figure 6. Mean percentage of students displaying off-task behaviors during baseline, intervention, and follow-up conditions across both classrooms with split middle celeration trend lines.

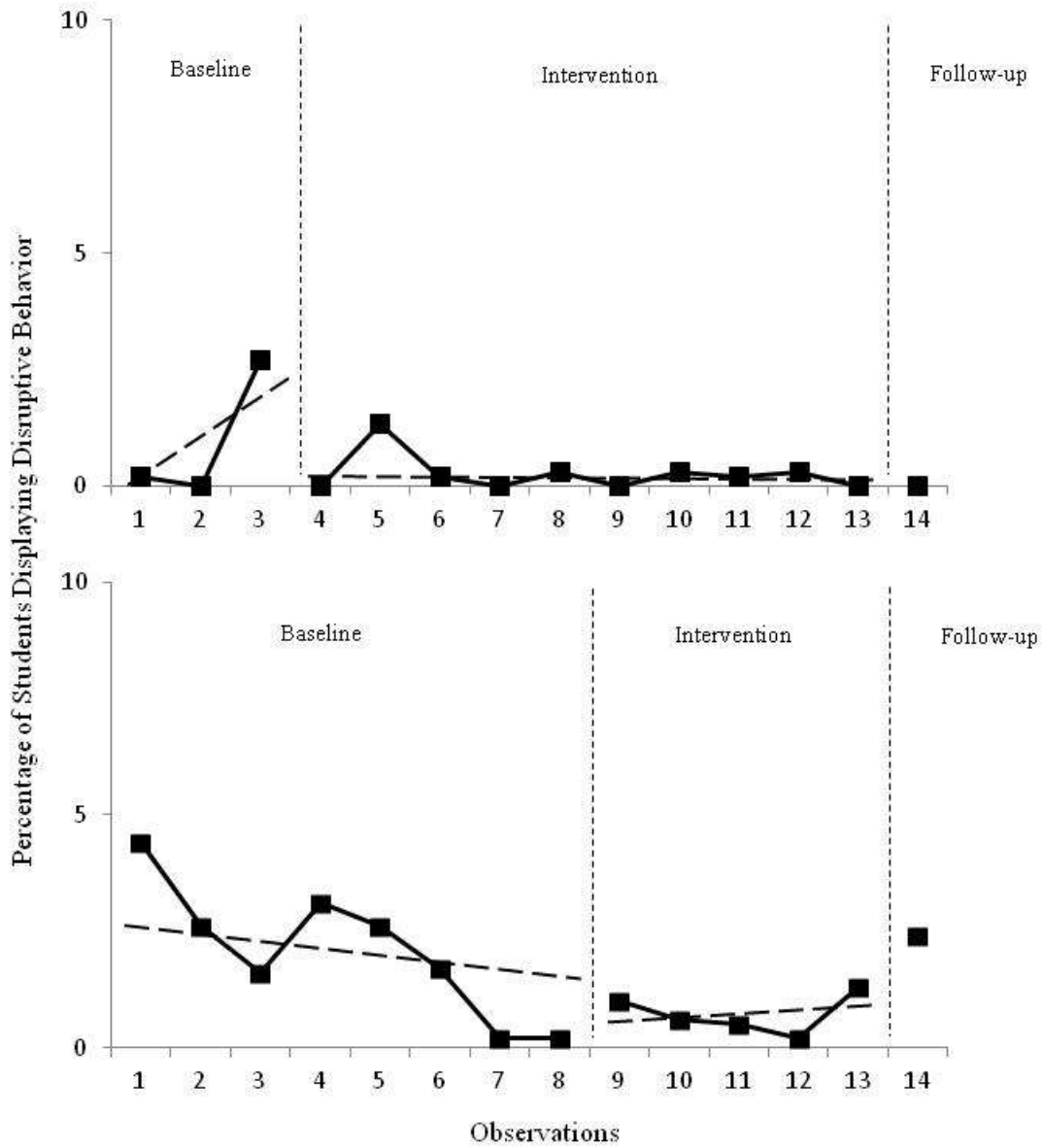


Figure 7. Mean percentage of students displaying disruptive behaviors during baseline, intervention, and follow-up conditions across both classrooms with split middle celeration trend line.