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The Effects of Three Different Types of Opportunities to Respond on Disruptive Behavior in a Second Grade Music Classroom

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Abstract

The following research study was conducted to examine the effects of three types of opportunities to respond (OTRs) on student disruptive behavior in a music class setting. Participants in this study were male and female students ranging from 6 to 9 years old in the same second grade class. Students were each called upon to read rhythms from flashcards in duple meter containing both quarter notes and paired eighth notes. Using an alternating treatments design, students read a card individually and the class responded in one of the following ways: (a) no response, (b) using a verbal choral response, or (c) using a nonverbal choral response. The rate of teacher delivered OTRs, teacher praise and corrections, and student correct and incorrect responses were also counted. Students had the lowest rates of disruptive behavior during the nonverbal choral echo and the highest rates during the individual response with no echo.

The Effects of Three Different Types of Opportunities to Respond on Disruptive Behavior in a Second Grade Music Classroom

High rates of student disruptive behavior are a common complaint among teachers and school personnel (Pisacreta et. al., 2001). Fortunately, studies have shown that increasing active student engagement in the lesson increases academic performance (Heward, Courson, & Narayan, 1989; Heward et al., 1996; Godfrey et al., 2003) and reduces disruptive behavior (Armendariz & Umbreit, 1999; Godfrey et al., 2003). One instructional strategy to increase active student engagement is the use of opportunities to respond (OTR). "An OTR can be defined as the interaction between a teacher's academic prompt [antecedent stimulus] and a student's response [or behavior]" (Haydon, Mancil, & VanLoan, 2009, p. 268). There are several types of OTRs that can be used in the classroom setting, including hand raising, choral responding, nonverbal responses (e.g., indicating a multiple choice response by holding up a certain number of fingers), and using response cards (e.g., white boards or flashcards). Research has consistently shown that increasing rates of OTRs and using types of OTRs that effectively engage most students (e.g., unison or choral responding vs. individual hand raise) lead to increases in desired student behavior and academic outcomes (e.g., on-task behavior, low rate of student disruptive behavior, high rate of correct responses; research described subsequently).

Although there is a substantial amount of research on the effects of OTRs on student disruptive behavior and academic performance in general or special education settings, there is a lack of similar research available in music class settings. In the remainder of this introduction, I examine (a) the research available on the positive effects of increasing OTRs in the classroom, (b) the effects of different types of OTRs, (c) the positive effects of OTRs in

conjunction with teacher feedback, and (d) the need for research on OTRs in music classrooms. Then, I describe the method and results from this thesis study, which I conducted to examine the effects of different types of OTRs on students' disruptive behavior and correct/incorrect responding in a second grade music classroom. I conclude with a discussion of study results, limitations, and implications.

Positive Effects of Increasing OTRs in the Classroom

Research has shown that an increased rate of available OTRs increases on-task behavior and student achievement, as well as decreases off-task and disruptive behavior (Cavanaugh, 2013; Conroy, Sutherland, Snyder & March, 2008; Haydon et al., 2010). Specifically, when teachers increase their rates of OTRs, students display a higher rate of correct responses (Cavanaugh, 2013; Sutherland et al., 2003), an increase in on-task behavior or decrease in off-task behavior (Christle & Shuster, 2003; Godfrey, Grisham-Brown, Shuster, & Hemmeter, 2003; Lambert, Cartledge, Heward, &Lo, 2006; Simonsen et al. 2008), as well as a decrease in disruptive behavior (Carnine, 1976; Sutherland et al., 2003; West & Sloane, 1986; Simonsen et al., 2008).

For example, Haydon et al. (2009) conducted a study on the use of verbal choral OTRs in a general education classroom, and found that a student's overall rate of disruptive behavior decreased and correct responses and on-task behavior increased when the rate of choral OTRs was increased to approximately three OTRs per min. In 2011, Haydon and Hunter saw an overall improvement in on-task behavior and correct responses when a nonverbal unison response was used as opposed to a single student response. The nonverbal response in this case was a student indicating their selection from a multiple choice by holding up a number of fingers. The unison response allowed for a higher rate of

available OTRs, whereas the single-student response allowed a much lower rate of OTRs. Both studies focused on one or two students in a general education setting, and used a reversal/withdrawal design.

Further research has been conducted on the use of response cards and their impact on student disruptive behavior specifically in a math setting. Lambert, Cartledge, Heward and Lo (2006) used a single subject reversal/withdrawal design to compare both a single-student response condition and a whole-class response card condition. Again, the rate of OTRs was high during the response card condition, and low during the single-student response condition. The difference between the response card condition and the unison responses used by Haydon et al. (2009) and Haydon and Hunter (2011) was that students wrote their answers on white boards instead of verbally responding in unison. Lambert et al. found that the rate of student disruptive behavior during the response card condition was considerably lower than that of the single-student response condition. In fact, that was no overlap in the data between the single-student response and response card conditions. Again, this study was conducted by observing nine individual students using a reversal/withdrawal design.

These studies all show that by increasing the rate of OTRs through choral or unison responding, students engage in higher rates of on-task behavior and lower rates of disruptive or off-task behavior. Academic success also increases as correct responses increase during conditions with high rates of OTRs. The question remains from all three studies whether there is a difference between the different types of OTRs and their effects on all these behaviors. Next, I discuss current research that compares the use of verbal choral responses, response cards, and individual student responding.

Relative Effects of Different Types of OTRs

The different types of OTRs used in a classroom can also have varied effects on student behavior and academic outcomes. Researchers have shown that choral responding leads to greater increases in student academic achievement and decreases in off-task behavior than traditional hand-raising (Godfrey et. al. 2003; McKenzie & Henry, 1979; Miller, Hall, & Heward, 1995; Sainato, Strain & Lyon, 1987; Sindelar, Bursuck, & Halle, 1986; Wolery, Ault, Doyle, Gast, & Griffen, 1992). The benefits of a mixed-mode of responding, which combine the use of choral and individual responding (used at random), have also shown higher rates of active student involvement and lower rates of disruptive behavior (Haydon et al., 2010). Similarly, the use of response cards has also been shown to lead to greater improvements in academic achievement and student behavior than traditional hand raising (Gardner, Heward, & Grossi, 1994; Godfrey et al., 2003; Narayan, Heward, Gardner, Courson, & Omness, 1990).

In a study conducted by Armendariz and Umbreit (1999), the rate of student disruptive behavior decreased from 43.3% of observed intervals using a conventional lecture method to 8.3% of observed intervals when response cards were used. The use of response cards have also been compared to verbal choral responding in a preschool setting, and have again shown to have higher rates of student engagement and on-task behavior, and lower rates of inappropriate behavior than that of a verbal choral response (Godfrey et al., 2003). The results of these two studies indicate that the use of response cards may further reduce the rate of student disruptive behavior beyond that of simply increasing the rate of OTRs. Their results also indicate that academic achievement increases beyond that of a verbal choral response. The results of both studies indicated

that teacher delivered praise and corrections also increased with the use of response cards, and students were subsequently given increased feedback on their responses.

The use of a mixed mode of responding, which incorporates individual and choral responses, may also reduce disruptive behavior and increase academic engagement and active responding. Combined with the results of the initial two studies by Haydon and colleagues (Haydon et al., 2009; Haydon & Hunter, 2011), the use of a nonverbal unison response in a mixed setting may have an even larger impact on student disruptive behavior and academic involvement. All three studies focused on individual students rather than examining the behavior and academic achievement of the class as a whole. It is also important to note that all these studies were also conducted in a general education setting rather than in a music class.

Positive Effects of OTRs in Conjunction with Teacher Feedback

As teachers provide more frequent and effective OTRs, they also increase their opportunities to provide specific feedback contingent on students' responses. For example, research has demonstrated that an increased rate of OTRs is positively correlated with increased rate of teacher praise (Gunter et al., 1993; Sutherland, Wehby, & Yoder, 2002), which has been shown to decrease problem behavior and increase academic success in a general education setting. Depending on the accuracy of student responses, this feedback may be either positive (i.e., praise) or corrective (i.e., error correction). Both types of teacher responses are associated with increases in student correct answers and additional teacher praise for these answers (Sutherland et al. 2003, Sutherland et al., 2002; Simonsen et al., 2008; Trussell, 2008).

Increases in teacher feedback have also been noted in studies examining the use of response cards as opposed to hand raising (Munro and Stephensen, 2009). It was noted anecdotally in this study that that the teacher gave only individual feedback during the hand raising condition (i.e., only the student who provided the answer received feedback), whereas she provided whole-class feedback during the response card condition (i.e., every student in the class received teacher feedback on their responses). "A potential reason for this outcome may be that in the response-card condition, the teacher had more information about errors across all students and may have been in a better position to provide informed feedback" (Munro & Stephensen, 2009, p. 799). This indicates that the use of response cards, rather than individual verbal or choral responses, may provide teachers with more evidence of individual student progress and subsequently provide more opportunities for teachers to deliver praise and corrections. However, response cards may not be the best fit for nonverbal responses in a music class when examining specific music skills (like performing rhythms), which are difficult for students to represent in writing. Thus, more research is currently needed on the use of OTRs in a music setting.

Need for Research on OTRs in Music Classrooms

There is currently very little research specifically on the use of OTRs in the general music setting. However, researchers have studied what activities traditionally occur during a music class, and how these activities affect music performance. Some of these studies may be relevant to the current study, as they examine what elements of music learning are important and may contribute to the types of OTRs that could be used in a music class.

In a study conducted by Wang and Sogin (1997), 56% of teachers indicated on a survey that they spend more than half of their allotted for music instruction singing. An analysis of corresponding videotaped lessons indicated that teachers actually spent the most of their time moving (M = 26.14%), followed by singing (M = 18.75%), and then playing instruments (M = 16.27%). All of these activities could be used in an individual response condition or unison response condition. Both movement and playing instruments could also be easily translated to a nonverbal unison response condition. These skill sets, however, are quite different than those described in studies conducted in the general education setting. Students in a music classroom engage in movement, singing, or playing an instrument are not necessarily giving short and discrete answers. This would make the use of response cards a somewhat inappropriate indicator for musical achievement. Response cards could be used in a similar method to that described in previous studies when (a) reviewing musical vocabulary or symbols, (b) writing rhythms or melodies, or (c) listening to and describing music.

Hungarian Zoltàn Kodàly was one of the first music educators to highlight music literacy as an essential component of a musician's skill set (Jacobi, 2012). Kodàly also emphasized that in order for students to continue as musicians independently, they must be able to read and write music (Jacobi, 2012; Sinor, 1986). Music reading contains several different elements from that of text reading (Roux et al., 2007; Jacobi, 2012). In a study conducted by Gromko (2004), it was determined that music reading contained four major components: (a) reading comprehension, (b) audiation, (c) spatial-temporal reasoning, and (d) visual perception of patterns or notes (Gromko, 2004; Jacobi, 2012). Thus, an important element to the understanding and performance of music is audiation. Although

Kodàly originally described an "internal hearing" process (1941, 1974d, p. 198; Jacobi, 2012), Edwin Gordon coined the term "audiate," which refers to a process in which the person reading music is speaking or singing a pattern internally—a process which is essential to performance (Gromko, 2004; Jacobi 2012).

To facilitate the performance of a rhythm, music educators have students demonstrate audiation through movement. In a study conducted by Boyle (1970), the effects of foot-tapping and clapping on rhythmic sight-reading ability were examined to determine if the kinesthetic motion would impact rhythmic performance. Participants who engaged in clapping and foot-tapping showed significant improvement in their sight-reading ability by the end of the study (Hayward & Gromko, 2009). Further, McPherson, Bailey, and Sinclair (1997) demonstrated that musicians who were more advanced associated fingerings with recordings of learned music. This demonstrates a strong connection between auditory, kinesthetic, and visual processes within music performance. Therefore, a kinesthetic response, rather than a written response card, may be a better nonverbal unison response in a music class. For the purposes of this study, a motion was developed to serve this purpose. This motion is referred to as "one-hand, two fingers," during which a student gently taps the rhythm they read, rather than saying it out loud, using two fingers into the palm of their other hand.

Study Purpose and Research Questions

In sum, research in general and special education settings indicates that higher rates of OTRs and specific types of OTRs (e.g., choral or mixed responding; non-verbal unison responses, like response cards) lead to desired student outcomes. However, there is no parallel research in music settings. From research in music classrooms, it appears that a

non-verbal motion, rather than a response card, may be a more appropriate non-verbal unison response; however, no research has systematically studied the effects of different types of OTRs in the music setting. The purpose of this study is to address this gap in the research literature.

The question posed for the current study is: What are the effects of three different types of OTRs (individual response with no echo, individual response with a verbal choral echo, and individual response with a nonverbal choral echo) in a general music classroom on students' disruptive behavior and correct/incorrect responses? The hypothesis for the current research was that when students in a general music classroom were presented with a nonverbal unison OTR, they would engage in a lower rate of disruptive behavior, as this condition is most similar to the response card condition in other studies. I also hypothesized that students would demonstrate more correct and fewer incorrect responses during this condition. Further, I examined whether there were differences in the rates of teacher-delivered OTRs, praise, and corrections across conditions.

Method

Participants and Setting

I randomly selected a second grade music class from the classes I taught at a New England elementary school. The selected music class met in the morning once every three school days for 40 min. During a typical music class, I would begin class with a listening activity that lasts for 5-7 minutes. During this activity, students would respond to the piece through movement, or describe the piece verbally or in writing. From here, I would spend 5-10 minutes on music literacy. This activity may be rote, practice or performance in speaking, reading, or writing a rhythm or melody. After this, I would spend 10-15 minutes

on some sort of movement activity such as a game or a dance. I would switch gears again for the final 10-15 minutes of class by working on a song that is either sung, performed on instruments, or a combination of the two. I use any remaining time by performing a song for my students and asking them to listen and answer questions about the performance.

Once I randomly selected the class, I reviewed the purpose of the study, study procedures, and the use of videotape with students during their regularly scheduled music class. I made it clear that this study was meant to collect data on behavior and responses only, not on specific students and their performance. On the same day students received this information, I sent a parent permission form home to parents. (Students were also trained how to use this form, and how to instruct their parents on completing it.) This form was available in both English and in Spanish. If interested, parents signed the form granting permission for their child to participate in this study. Students also gave their permission (child assent) orally once parent permission was received.

After obtaining consent, 19 of the 20 students in the class enrolled in this study from the same second grade music class, ranging from ages 6-9 years old. Three students elected to remain off camera, but still participated in the study. Students included both males and females, and represented multiple ethnicities including white, black, Hispanic, and Asian. Students were all members of the same second grade class, and were at a similar educational level. The music class met in the morning once every three school days for 40 minutes. Most students (> 80%) spoke English as a primary language; less the 20% were English Language Learners.

Materials

For this study, students read flashcards from the standard curriculum adopted by the school called *Conversational Solfege* (Feierabend, 2001). The flashcards used from this curriculum contained rhythmic patterns, including quarter and eighth notes in duple meter form (i.e., two beats per measure, quarter note receives one beat and a pair of eighth notes receives one beat). I used iMovie on a Macintosh laptop computer to videotape student and teacher behavior during observation times.

Experimental Design

This study used an experimental single subject alternating treatments design with a baseline condition (Gast, 2010) to compare student behavior during each treatment condition. During the initial baseline phase, data were collected on participating students in the selected second grade music class across five consecutive class periods. The students and teacher were recorded for a 5-min sample of a 40-min music lesson using the camera on the laptop computer. The purpose of this baseline phase was to determine the amount of student disruptions; student correct/incorrect responses; and teacher-delivered OTRs, praise, and corrections that occurred during lessons utilizing teaching practices that were not specifically focused on different types of OTRs. During the baseline phase, students chorally read rhythms from a card and used the nonverbal "one-hand, two-fingers" motion simultaneously. The subsequent alternating treatments phase included three different instructional (OTR) conditions, or treatments, delivered for 5 min each in a randomly selected order during each music class for the same second grade classroom across seven consecutive music classes.

Independent Variable

The independent variable of this investigation was the instructional OTR condition. Each OTR condition and the instructional materials being used (rhythm flash cards) are part of typical practice in this music classroom. The only changes made for the purposes of this study were (a) providing each condition for a specific amount of time (5 min) in a randomly selected order and (b) reviewing videotape to count student disruptions, correct and incorrect responses, and teacher-delivered OTRs, praise, and corrections.

Condition 1: Individual response, no echo. For this condition, students read a rhythm from a flashcard individually. Students were notified of this treatment with a verbal prompt requesting they read each card individually and that the rest of the class sit quietly. Students were asked to read a single 4-beat rhythm from a flashcard. Students were selected to read in order in which they were sitting. For this study, students were seated in a circle, and the teacher began with one student and moved to the next according to seating. Students were given four beats to audiate the rhythm (i.e., read it in their head), then four beats to read the card out loud.

Condition 2: Individual Response with a Verbal Choral Echo. For this condition, individual students were again asked to read a card, but this time the class read the same card chorally. This choral response occurred after the first student read the rhythm. The individual was again given four beats to audiate, four beats to read, and the class was given an additional four beats to read. Students were made aware of this treatment with a verbal prompt to both read the card individually and to echo the individuals response chorally.

Condition 3: Individual Response with a Nonverbal Choral Echo. For this condition, individual students were again asked to read a card, but the class audiated the

same card and tapped the rhythm as a nonverbal "echo." They tapped the rhythm from the card using two fingers from one hand into the palm of the other. This tapping occurred during initial audiation, individual reading, and the nonverbal response. Students were prompted to use "one hand, two fingers," indicating the motion they should incorporate and *not* respond verbally, but rather audiate a response while performing the nonverbal motion (one hand, two fingers).

Dependent Variables

There were two categories of dependent variables examined in this study: student and teacher behavior. The primary focus of this study was student disruptive behavior; however, student correct and incorrect responses were also studied. The rate of teacher delivered OTRs was also examined, as well as teacher delivered praise and corrective feedback.

Student disruptive behavior. Rates of disruptive behavior were examined during each condition. Disruptive behavior included out-of-seat, call-outs, rolling on the floor, movement that was not important to the lesson and noises that were not relevant to the lesson. Students that were out of their seat were those that were removed from their peers and not participating in the activity. Students who were near to their seat and still participating in some way were not considered to be out-of-seat. Call-outs included students that said or yelled observations, answers, or asked questions when they were not prompted by the teacher, or after the teacher had already moved to another student. Another version of a call-out was students who intentionally said a rhythm over a peer, or who spoke a rhythm too quickly and rushed the steady beat. Movement included rocking or bodily motion, leaning out into the center of the circle, or a student rocking their body or

head back and forth so that they block the view of a peer. Finally noises included clapping (not related to the nonverbal response), noises created by clothing, slapping, humming, and whistling. Disruptive behaviors displayed by any participating student were tallied, divided by minutes observed, and represented on a graph as a rate per minute. Counts were based on visual/audible evidence of disruption and teacher corrections (e.g., "Please do not call-out.").

Correct and incorrect responses. Rates of correct and incorrect responses were collected aurally and visually. The card itself was not visible on the recording, so the teacher's acknowledgement of a correct answer ("That is correct.") or when the teacher moved to the next student without correcting the first student was marked as a correct response. Incorrect responses were noted if the teacher verbally corrected a student, or gave a verbal reminder on a specific musical element to fix the next time a student read a rhythm. Students who rushed the steady beat slightly, but spoke the rhythm correctly, were not marked incorrect. A whole-class correct response was counted if at least 80% of students read the rhythm correctly. The teacher would also acknowledge a whole-class correct answer by either saying "that's correct," or by moving on to the next student. If less than 80% of students demonstrated the correct response, the teacher would ask the class to repeat the pattern or deliver an error correction. Correct and incorrect responses were counted for individuals when reading the card independently and for the whole class when they read successfully during an echo, and divided by the total number of minutes observed, and represented as rate (responses per minute) in a graph.

Teacher-delivered OTRs. An individual or class was given an OTR when they were asked to read a card either out loud (verbally) or to audiate using the "one-hand/two

finger" motion (nonverbally). Individual and class OTRs were also counted if a teacher posed a question to an individual or to the class, respectively. If the teacher called on a single student to ask a question, this was counted as an individual OTR. Conversely, if the teacher asked the class to answer chorally, this was counted as a class OTR. Class OTRs include whole-class choral readings (both verbal and nonverbal) of rhythm cards, choral responses to teacher directed questions, and whole-class choral echoes (verbal and nonverbal) of individual responses. In some videotaped sessions during this study, some students were asked to respond verbally while others responded nonverbally. Since all students were given an opportunity to deliver an answer at the same time despite the different modes, a class OTR was counted. For the purposes of this study, individual and class OTRs were combined into an overall OTR rate.

Teacher delivered positive and corrective feedback. Teacher delivered positive feedback, or praise, was divided into both behavior and academic praise. Incidences of behavior praise included when the teacher verbally or nonverbally recognized a student for demonstrating an appropriate behavior, changing an inappropriate behavior to an appropriate one, being a good listener, or demonstrating their readiness to respond (before the card was read). Academic praise included recognizing a student or the class for appropriately demonstrating an academic or musical element ("Nice job keeping the steady beat!"), demonstrating the skills required to perform the task such as watching the card as they read or matching the steady beat given in the teacher's counting, or fixing an academic mistake made the previous time they read. Teacher delivered corrective feedback was also divided into behavior and academic corrections. These corrections included examples listed above in the context of a correction. For example, rather than recognizing a student

for a positive choice, the teacher may ask the student to change an inappropriate behavior or watch the card carefully while they read. In this study, overall positive and corrective rates are reported.

Although the number of OTRs and positive/corrective feedback rates were not intentionally varied across conditions, it was possible that different OTRs could have resulted in faster or slower paced instruction and rates of feedback could also vary across conditions. To explore this descriptively, the number of OTRs presented and positive/corrective feedback delivered during each observed condition (baseline and the three OTR conditions) was tallied, divided by minutes observed, and represented as rate (statements per min) on a graph.

Inter-Observer Agreement

A second trained observer (a graduate student in special education) watched a randomly selected 30% of videotaped sessions within each condition (i.e., baseline and three OTR conditions). I trained this person on the operational definitions of each dependent variable and on how to record the frequency. The second observer then practiced on video segments that were not randomly selected as part of the 30%. Practice continued until the observer reached 90% agreement (calculated by dividing the lower frequency by the higher frequency and multiplying by 100%) with me. In addition, for any observation where IOA decreased below 80%, I met with the observer, reviewed the operational definitions, and asked her to recode that session. Although this only occurred three times during conditions in which there were a large number of behaviors to be tallied, this occurred more frequently for conditions that only contained a few behaviors

(four or fewer). During these conditions, if the observer and I were only one tally away from each other, IOA decreased below 80% and the condition was recoded.

IOA averaged: (a) 94% agreement on rate of student disruptive behavior (range = 80 – 100%), (b) 97% agreement rate of teacher delivered OTRs (range = 91 – 100%), (c) 91% agreement on rate of teacher delivered praise (range = 80 – 100%), (d) 94% agreement on rate of teacher delivered corrections (range = 82 – 100%), (d) 95% agreement on number of correct student responses (range = 88 – 100%), and (e) 95% agreement on number of incorrect student responses (range = 67 – 100%). Additionally we agreed 92% for both behavior (range = 71 – 100%) and academic (range = 80 – 100%) praise, and 96% and 88% for behavior (range = 82 – 100%) and academic (range = 71 – 100%) corrections respectively. We also agreed for 94% and 85% for individual correct (range = 82 – 100%) and incorrect (range = 0 – 100%) responses, respectively, as well as 98% and 97% for whole-class correct (range = 95 – 100%) and incorrect (range = 89 – 100%) responses, respectively. At times IOA was below the recommended 80%; as stated, this was due to the low occurrences of each count within an interval. Often there were only one or two counts per interval (for example, only two incidences of incorrect responses), and while we only differed by one count, IOA was still calculated as 50% agreement.

Procedures

During both baseline and alternating treatments phases, I implemented the appropriate condition and videotaped student behavior at the beginning of the music class. Specifically, after a brief warm-up activity (lasting 5 minutes), I set a timer and began the appropriate condition. During the baseline phase, students read rhythm cards chorally, simultaneously using both the verbal and nonverbal response, during a 5 min activity with

the *Conversational Solfege* (Feierabend, 2001). I also presented students with a high rate of OTRs during this phase. This mixed-responding is reflective of typical instruction in this class, and was different from the intervention conditions, which contained only one type of OTR (verbal, nonverbal or individual). Once data became stable or demonstrated a counter-therapeutic trend (e.g., increase in disruptive behavior during baseline), the class was moved to the alternating treatments phase. Baseline data collection lasted for 5 days.

During the alternating treatments phase, the order of intervention conditions was randomly selected before the start of each music class to reduce the likelihood of sequencing effects across the duration of the study. Each intervention was implemented during a 5-min activity with the *Conversational Solfege* (Feierabend, 2001) flashcards. Thus, data were collected for 15 min total (three 5-min conditions) during each day during the alternating treatments phase, which lasted for 7 days.

Analysis

Visual analysis was conducted by examining the trend, level, and stability within and across conditions. Trend was examined to determine if the rate increased, decreased, or remained stable. Specifically, I visually examined the graphs to determine if a change in the direction of a data path (trend) was present within each condition. I examined the level of each dependent variable by calculating the median rate for each condition and describing the median rate relative to other conditions. Finally, I examined stability by noting the range (min-max) of data points within each condition, describing the overall variability within the data from each condition, and considering the variability relative to that of other conditions.

Results

The results of this study are presented for each dependent variable across conditions: (a) student disruptive behavior, (b) student correct and incorrect responses, (c) teacher delivered OTRs and (d) teacher delivered praise and corrective feedback.

Student Disruptive Behavior

During the baseline (verbal and non-verbal choral responding) condition, students demonstrated disruptive behavior approximately one time per minute (*Mdn* = 1.0 disruptions per min), and data were somewhat variable (range 0.0 - 2.6) with an increasing trend (see Figure 1). Students demonstrated the lowest level of disruptions during the non-verbal echo condition (*Mdn* = 1.4 disruptions per min), and data were relatively stable (range 0.6 - 2.0), with a slight increasing trend throughout this condition. With the exception of one day where data overlapped with another condition, student disruptive behavior rates were consistently the lowest throughout this condition; however, all data points within the non-verbal echo condition overlapped with baseline data. Students demonstrated higher levels of disruptions during the verbal echo condition (*Mdn* = 1.8 disruptions per min), and data were variable (range 1.4 - 4.0) and overlapped with the other conditions, with a slightly increasing trend and 2 data points that exceeded the range of disruptive behavior during baseline. Students demonstrated the highest level of disruptive behavior during the individual OTR condition (*Mdn* = 2.0 disruptions per min); data were variable (range 1.2 - 4.0) and overlapped with other conditions, with a clear increasing trend throughout this condition and the final three data points exceeding the range in baseline. In sum, the non-verbal echo condition was associated with the lowest levels of student disruptive behavior, relative to other individual or mixed responding conditions, and all data points overlapped with baseline (choral responding).

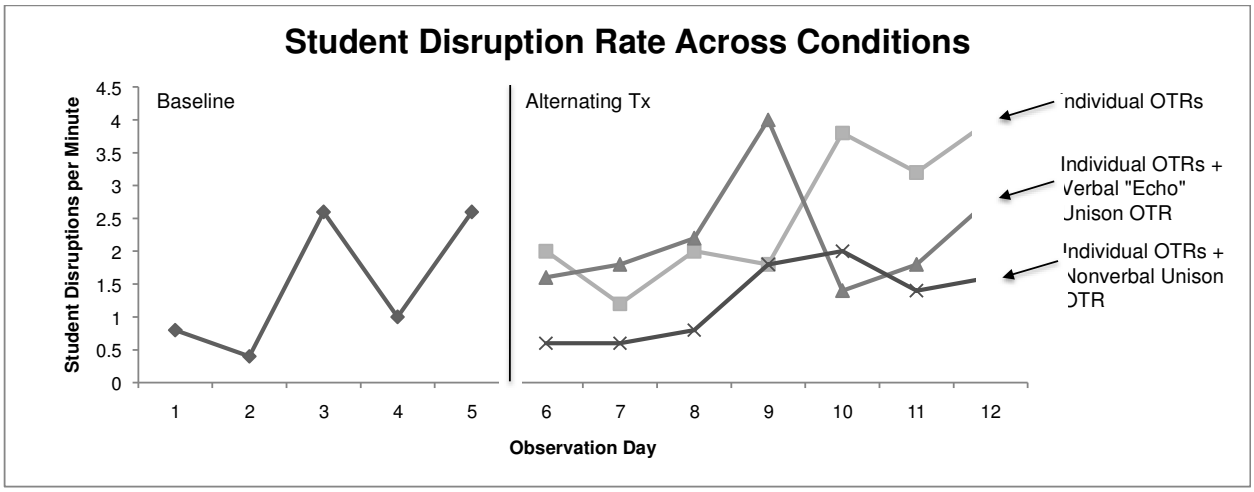

Figure 1. Rate of student disruptions across conditions.

Student Correct and Incorrect Responses

During the baseline condition, student correct responses occurred approximately 6 times per minute (*Mdn* = 6.0), and data were slightly variable (range = 4.8 - 6.6) with a stable trend (see Figure 2). Students displayed the highest rate of correct responses during the verbal choral echo condition (*Mdn* = 11.4), with moderate variability (range = 9.4 – 15) and an increasing trend. With the exception of one day of overlap, student correct responses were consistently highest during this condition. Correct responses were slightly lower during the nonverbal choral echo condition (*Mdn* = 11), with moderate variability (range = 7.8 – 12) and an increasing trend. Of all three conditions, the nonverbal choral echo had the highest amount of variability. The lowest rate of correct student responses occurred during the individual response condition (*Mdn* = 8.2), which had low variability (range = 6.2 – 9.4) and a very slight increase in trend (See Figure 2). The data points in this condition never overlapped with those of the verbal choral response, and were usually lower than that of the nonverbal choral response with the exception of two overlapping data points. In summary, the verbal choral response provided the highest rate of correct

student responses, while the individual response had the lowest rate. Overall, all data points in each treatment condition were higher than during the baseline condition.

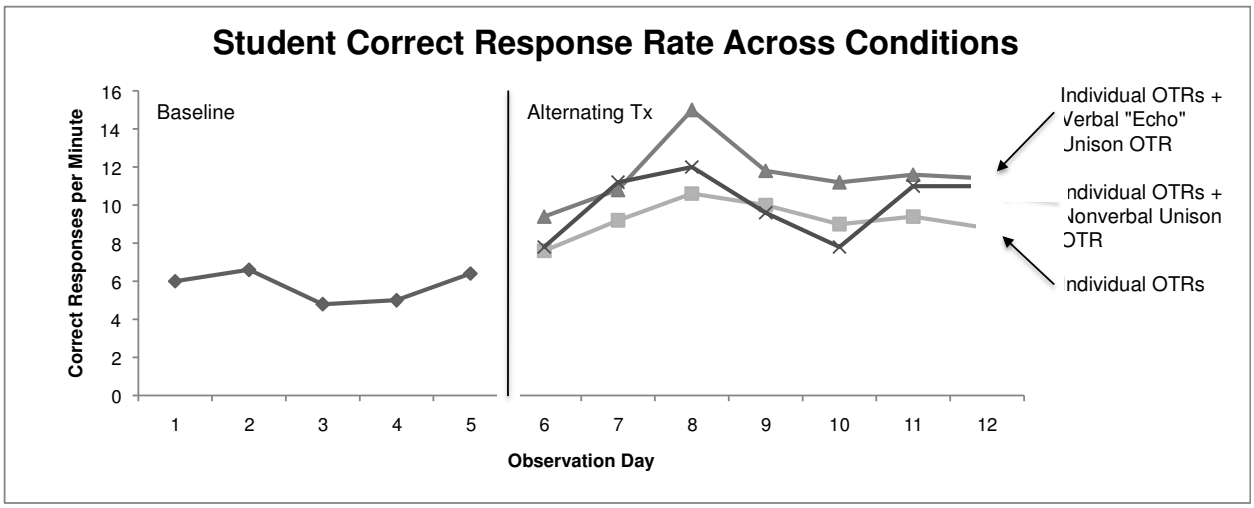

Figure 2. Rate of student correct responses across conditions.

Incorrect student responses yielded inverse results. During the baseline condition, student incorrect responses occurred approximately 1.6 times per minute (*Mdn* = 1.6), and data were slightly variable (range = 0.8 – 2.2) with a decreasing trend (see Figure 3). Students displayed the lowest rate of incorrect responses during the verbal choral echo condition (*Mdn* = 0.8) with moderate variability (range = 0.6 – 1.6) and a decreasing trend. Most data points were within the range of the baseline data, with the exception of days 3, 4 and 6 of treatment. Incorrect responses were higher during the nonverbal choral echo condition (*Mdn* = 1.2) with higher variability (range = 0.6 – 3.2) and a decreasing trend. The initial data point exceeded the baseline, and the remaining data points were within the range of baseline data. Again, of all three conditions, the nonverbal choral echo had the highest amount of variability. The rate of incorrect student responses during the individual response condition was the same as the nonverbal choral response (*Mdn* = 1.2), but with much lower variability (range = 0.4 – 1.6) and a slight increase in trend. With the exception

of day 5 of treatment, all data points were within the range of baseline data. While the nonverbal choral response had the highest variability in data, it also had the most dramatic decrease (from 3.2 per minute on day 1 of treatment to 1 per minute on day 7). With the exception of two overlaps, the verbal choral response condition had the lowest rate of incorrect student responses. Across conditions, there were many overlapping data points, making it difficult to clearly infer a relation between condition and incorrect responses.

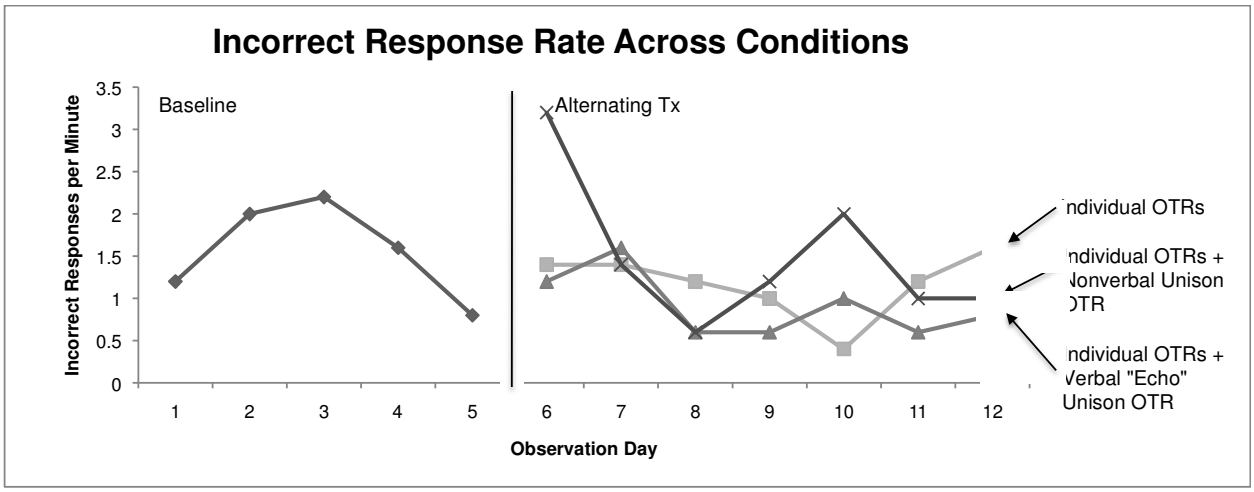

Figure 3. Rate of student incorrect responses across conditions.

Independent Variable: Teacher Delivered OTRs

Although the rate of OTRs was not systematically varied, I collected data to determine if the rate differed among conditions. During the baseline condition, teacher-delivered OTRs occurred approximately 7 times per minute (*Mdn* = 7.2), and data were relatively stable (range = 6.6 – 8.6) with a stable trend (see Figure 4). The highest rate of teacher-delivered OTRs occurred during the verbal choral echo condition (*Mdn* = 12.2), with some variability (range = 10.6 – 15.6) and a slightly increasing trend. While some data points intersected those of the nonverbal choral response, this condition was usually the highest. The rate of OTRs was only slightly lower during the nonverbal choral echo condition (*Mdn* = 12), with some variability (range = 9.8 – 12.6) and a slightly increasing

trend. The lowest rate of OTRs occurred during the individual response condition (*Mdn* = 9.2), which had some variability (range = 7.6 – 10.6) and a slight increase in trend. The rate of teacher-delivered OTRs was consistently lowest during this condition, with no overlaps in data. The highest rate of teacher-delivered OTRs occurred during the verbal choral echo condition, although this condition shared four data points with the nonverbal choral echo condition. All data points (with the exception of day one during the individual OTR condition) exceeded the range of the baseline.

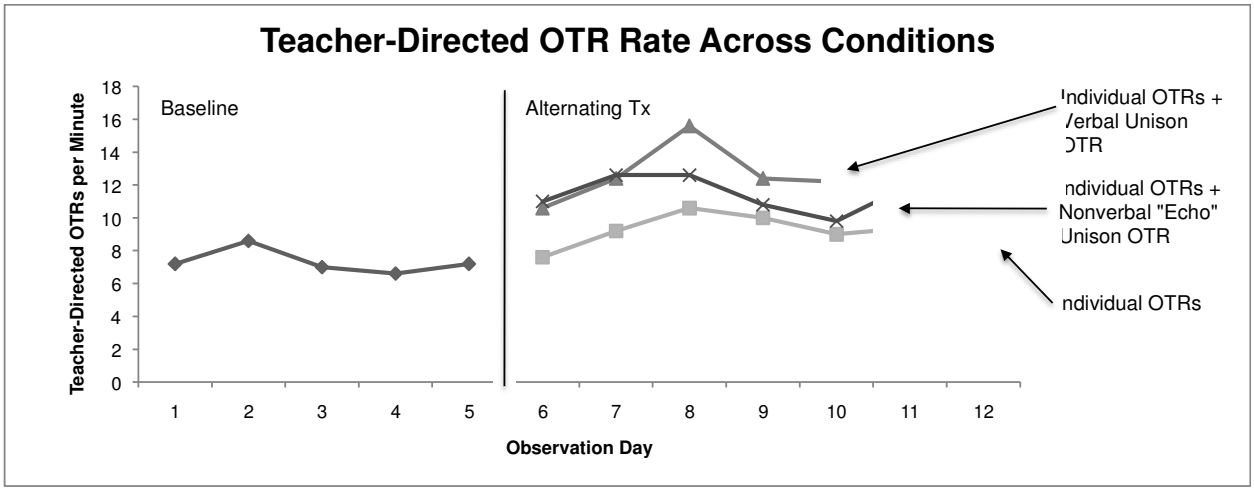

Figure 4. Rate of teacher-directed OTRs across conditions.

Independent Variable: Teacher Delivered Praise and Corrective Feedback

During the baseline condition, teacher-delivered praise occurred approximately 2 times per minute (*Mdn* = 2.4) with some variability (range = 1.4 – 4.8) and an increasing trend (see Figure 5). The highest rates of teacher praise occurred during the nonverbal choral echo condition (*Mdn* = 4.0), with some variability (range = 2.6 – 5.8) and an increasing trend with the final two data points exceeding the range of the baseline data. This condition had the highest rates of teacher-delivered praise overall with the exception of one overlapping data point. The individual response condition had only slightly lower rates of teacher praise (*Mdn* = 3.2), with some variability (range = 2.6 – 4.4) and a steady

trend with all data points within range of the baseline. data The lowest rates of teacher praise occurred during the verbal choral echo condition (*Mdn* = 2.0), which had some variability (range = 0.8 – 2.8) and a steadily increasing trend. Although this condition was within range of the baseline with the exception of day 1 of treatment, this condition had no overlapping data with other conditions, and was consistently the lowest of the three conditions. The highest rates of teacher-delivered praised consistently occurred during the nonverbal choral echo condition, and the lowest were present during the verbal choral echo condition.

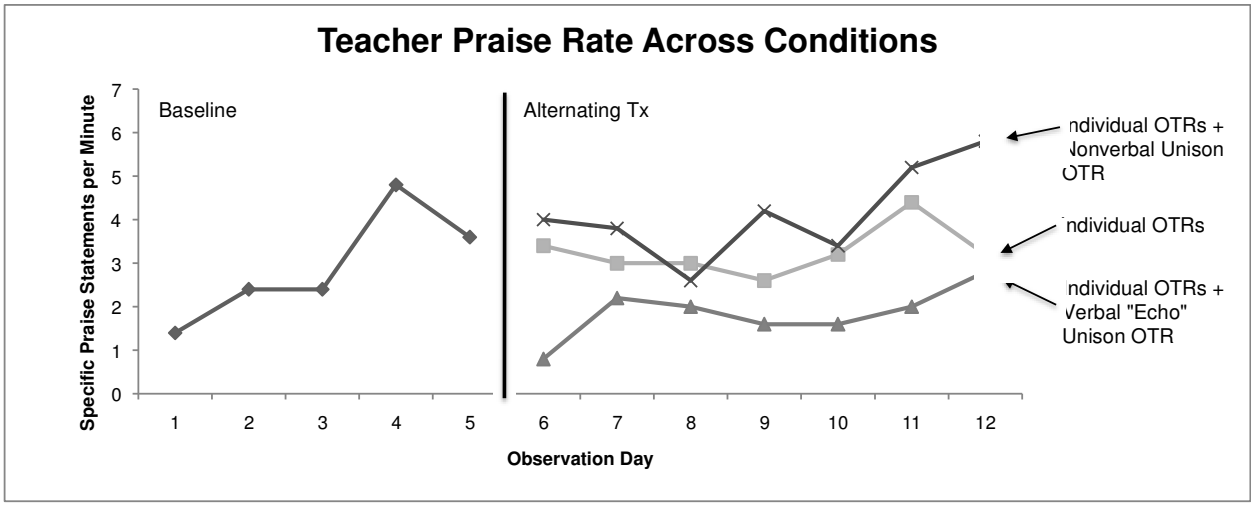

Figure 5. Rate of teacher-delivered praise across conditions.

During the baseline condition, teacher-delivered corrective feedback occurred approximately 3 times per minute (*Mdn* = 3.4), with some variability (range = 2.6 – 4.2) and a decreasing trend (see Figure 6). The data from all three treatment conditions intersected several times for this variable. Overall, the lowest rate of corrective feedback occurred during the individual response condition (*Mdn* = 3.2), with high variability (range = 1.8 – 4.8) and a slight decrease in trend. This condition remained within range of the baseline data, with the exception of day 3 when it exceeded baseline data and day 6 when it was

lower than baseline. The rate during the verbal choral echo condition was only slightly higher (*Mdn* = 3.6), with high variability (range = 2.6 – 5.4) and a slightly decreasing trend. This condition also remained within range of the baseline, with the exception of days 1 and 4 when it exceeded the baseline. The nonverbal choral echo condition had the highest rate of corrective feedback (*Mdn* = 4.0), with high variability (range = 1.2 – 5.2) but this time with an increasing trend. Like the other two conditions, this condition remained within the range of baseline with the exception of day 4 when it exceeded baseline, and day 6 when it was lower than baseline. Overall, despite high variability, the nonverbal choral echo condition had the highest rates of teacher-delivered corrective feedback as well as teacher-delivered praise.

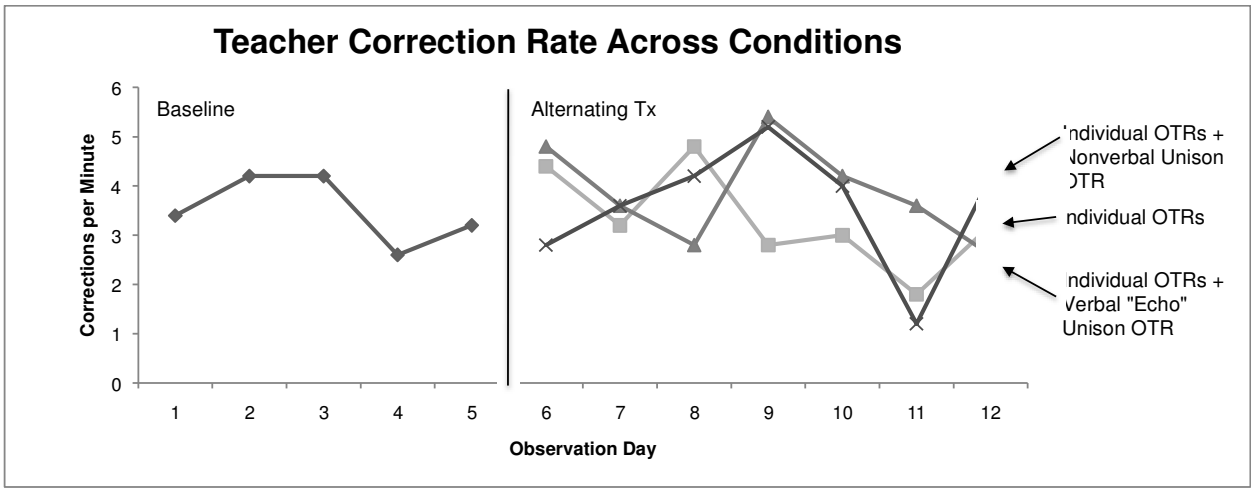

Figure 6. Rate of teacher-delivered corrections across conditions

Discussion

In this section, I discuss the results for each treatment condition and examine how this supports the existing research on the use of OTRs. I then discuss the limitations of this research study and its implications for future research.

Discussion of Study Results

The findings of this study support research previously conducted in the general and special education classroom settings, which indicated that an increased rate of OTRs decreases disruptive behavior and increases correct student responses (Cavanaugh, 2013; Conroy, Sutherland, Snyder & March, 2008; Haydon et al., 2010; Haydon and Hunter, 2011; Haydon, Mancil and Van Loan, 2009; Sutherland et al., 2003). Although the rate of teacher delivered OTRs was not manipulated in this study, those conditions with higher rates present did have the lowest rates of student disruptive behavior and higher rates of correct student responses. The highest rate of OTRs in the current study occurred during the verbal echo condition, the same condition that had the highest rate of correct student responses and a lower rate of disruptive behavior than the individual response condition. This result is similar to studies that employed a unison response condition (i.e., Godfrey et al., 2003; Haydon, Mancil, & Van Loan, 2009; Haydon et al., 2011). The rate of OTRs available in the nonverbal choral echo condition was only slightly lower than that of the verbal choral echo, and the nonverbal echo condition had the lowest rate of disruptive behavior across conditions. Conversely, the lowest rate of teacher delivered OTRs occurred during the individual response condition, which had the highest rate of disruptions and lowest rate of correct student responses.

The low rate of student disruptive behavior during the nonverbal choral echo condition is similar to results of studies utilizing other nonverbal unison responses (Armendiaz & Umbreit, 1999; Godfrey et al., 2003; Haydon & Hunter, 2011; Lambert, Cartledge, Heward, & Lo, 2006). Furthermore, research has shown that use of a nonverbal unison response (e.g., response card, unison gesture indicating selection from multiple choice) leads to greater decreases in student disruptive behavior than a verbal choral

response (e.g., Godfrey et al., 2003) or individual response (Lambert et al., 2006). These results are similar to the current study, which found the least amount of student disruptive behavior during the nonverbal echo response condition.

When students engaged in the nonverbal unison response, they also initially demonstrated a higher rate of incorrect responses than in the verbal unison response, and eventually a lower rate of incorrect responses than when engaged in the verbal unison response. Additionally, the highest rates of teacher delivered feedback (both praise and corrective feedback) were present during the nonverbal unison echo condition. The use of a choral response was shown in the study conducted by Godfrey et al. (2003) to provide students with an opportunity to receive teacher feedback as a whole class, while the use of response cards indicated students could receive 1:1 feedback on their answers. In this study it was anecdotally noted that with an increase in OTRs, students were given more opportunities to receive teacher praise and feedback on their answers. A similar finding was noted by Munro and Stephensen (2009) who described how teachers were better prepared to deliver feedback during a response card condition as it provided them with more accurate information on student performance. Similarly, I noted that it was easier to deliver feedback to students on both academic and behavior performance during the nonverbal unison condition than the other two conditions.

The nonverbal unison response condition also contained the highest rate of teacher-delivered praise. This not only indicates that student disruptions may have been lowered by the increased rate of teacher praise, but reaffirms the findings by Sutherland, Wehby, and Yoder (2002) that the rate of teacher delivered praise correlates with the rate of OTRs. In the study conducted by Sutherland et al., it was hypothesized that as a result of

increased correct response rate, due to additional practice from an increased rate of available OTRs, students received more academic praise from their teachers, which elevated the rate of teacher-delivered praise.

Limitations

Although the results of this study do add important information to the existing literature, there were several limitations for this study. First, I was the teacher in this study. When a participant in the study is also counting and checking the data, this may introduce bias. To reduce the likelihood of bias, IOA was conducted and an objective observer checked 30% of the recorded observations within each condition.

Second, this particular unit (reading rhythms in duple meter) lasted far beyond the length it would in a typical music class. Beginning on day 4 of treatment, student correct responses began to level out and remained steady for the remainder of the study. This indicates that students may have become familiar with the material and, as a result of academic fatigue, student disruptive behavior may have been impacted. The length of each day of treatment also may have impacted student endurance: each day of treatment took 15 min of this class's general music time. In a typical music class, students will perform up to four activities including singing, dancing, and playing instruments. Due to the length of each condition (5 min) and subsequent length of treatment (15 min each class), students lost at least one activity per day. This is not an accurate picture of typical music instruction for this class.

Third, the rate of student disruptions gradually increased across all treatment conditions for the duration of the study, despite an overall increase in teacher delivered praise and a decrease in teacher delivered corrections. This does not corroborate the

research that states increased teacher praise will result in a reduction of student disruptive behavior (Pisacreta et. al. 2011). Typically, in this music class, this portion of the unit (reading rhythms in duple meter) lasts for three to four music classes. For the purposes of this study it lasted for 12, including 5 days of baseline and 7 days of intervention conditions. Given that students demonstrated a steady increase in correct response rate (beginning at 7.8 per minute and ending with 9.87 per minute) and a decrease in incorrect response rate (beginning at 1.93 per minute and ending with 3.4 per minute) across treatment conditions, students may have been prepared to move to the next step in the unit.

Furthermore it is still unclear if the variances in correct and incorrect student responses between the verbal and nonverbal unison response phases was due to the type of OTR, or what we were able to see and hear on the recording. Initially student correct responses during the nonverbal choral response were lower than that of the verbal unison response, while the two ended at the same rate. During the verbal choral echo condition, it is difficult to distinguish individual voices on the recording and determine if at least 80% of the students demonstrated the correct response. During the nonverbal choral echo condition, it is easier to see which students were correct and incorrect. While this was a limitation of data collection for the verbal choral echo condition, it does corroborate anecdotal evidence from previous studies indicating that teachers are provided with more evidence of student performance when using a nonverbal choral response (Munro & Stephensen, 2009).

Implications

The results of this study indicate that the use of a nonverbal unison response can be applied in classrooms to reduce disruptive behavior and increase academic achievement . These responses can be similar to the one used in the current study or others, such as indicating a number selection by holding up fingers (Haydon & Hunter, 2011) or using response cards (Armendariz & Umbreit, 1999; Godfrey et al., 2003; Lambert et al., 2006; Munro & Stephensen, 2009). Teachers may also find it easier to deliver feedback during these nonverbal conditions. Anecdotal evidence has suggested that the rate of teacher feedback increases when nonverbal unison responses are used (Armendariz & Umbreit, 1999; Godfrey et al., 2003). More research is needed to determine the exact rate of teacher feedback during a nonverbal response condition and its effects student behavior and academic success.

Teachers in music settings may also apply both verbal and nonverbal choral responses to reduce disruptive behavior and increase academic achievement in their classrooms. The current study demonstrated a reduction in disruptive behavior during both the verbal and nonverbal choral response conditions, as well as an increased rate of correct student responses during both conditions. Additional research is needed to determine if the same effects are present in specialty areas such as art and physical education. Since these disciplines are not only different from the general education classroom, they also differ greatly from each other and from a music setting. The types of OTRs appropriate for these settings may also vary greatly. More research is needed in music settings as well, as there is still very little available.

Additional research may be performed to determine if the nonverbal response selected for this study has an impact on students' rhythmic literacy, and whether or not the

motion directly impacts rhythm performance. Although research has been conducted on movement and music literacy, additional research is needed to determine the impact of this specific movement. The use of response cards themselves during a music class could also be studied to determine if their use has the same effects on student disruptive behavior and academic achievement as they do in the general education setting.

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