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The effects of having teachers implement teacher child interaction training on language and communication development

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The Effects of Having Teachers Implement Teacher Child Interaction Training on
Language and Communication Development

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Abstract

Prevention and intervention programs for language and communication skills are important, and should be implemented early to gain the maximum benefits. There is evidence that verbal modeling and adult verbal imitation of children may enhance these skills. Teacher training programs have been shown to be effective in modifying students' behaviors. Speech and language are also forms of behavior, thus the same principles should apply to coaching teachers how to modify verbal behavior to improve their communication skills. McIntosh, Rizza, and Bliss (2000) discussed a need for empirically supported treatments in schools and a need for treatment manuals in order to replicate programs, as they built a case to adapt the principles of a well-established parent training program, Parent Child Interaction Training (PCIT), to apply to a teacher training program using the name Teacher Child Interaction Training (TCIT). This study implemented TCIT in two preschool classrooms using a multiple baseline design to determine whether components of TCIT may also be useful for language and communication skills. Results indicate training was effective in modifying teachers' interactions with their students and their evaluations of children's language and communication skills improved.

The Effects of Implementing TCIT for Language and Communication Development

Language and communication skills are an essential part of our daily lives. Children who start out knowing more vocabulary words than their peers will continue to have exponentially larger vocabulary repertoires (Beck & McKeown, 1991) and will learn more fluidly than their peers (Adams, 1990). This is because the acquisition of novel concepts builds upon preexisting terminology (Adams, 1990). Similarly, an average first grader who is able to read knows about twice as many words as his or her non-reading peer, and research has shown this gap remains into his or her future (Beck & McKeown, 1991). Childhood communication skills are also the greatest predictor of later intelligence and school performance (Rosetti, 2001). Even into adulthood, the effects of our language and communication skills build on each other to allow more doors to be opened and can dramatically impact an individual's quality of life (Ruben, 2000).

Despite the powerful impact of language and communication skills, delayed communication is a prevalent developmental disability in young children that impacts 5 to 10% of the general population of children under 3 years old, with rates estimated even higher for children with at-risk characteristics (Rosetti, 2001). Jenkins, Bax, and Hart (1980) used both assessment by a speech pathologist and a psychologist who used the Reynell Language Developmental Scale and found that children with abnormal speech and language development were more likely to have behavioral problems, with the strongest correlation occurring in 2-year old children. While this study was correlational, one might hypothesize these behavioral problems are due to the fact these

young individuals know what they want, but they are not able to effectively communicate those desires. This is consistent with Carr and Durand's (1985) findings that when three young children (with communication delays due to autism, brain damage, and developmental delay with severe hearing impairment) were taught functional communication training, their behavior problems improved. Carr and Durand claimed their results supported their hypothesis that child behavior problems were a facet of nonverbal communication. Similarly, Bietchman, Wilson, Brownlie, Walters, Ingles and Lancee (1996) compared 5-year old children with and without language delays and found that children with language delays were more likely to exhibit behavioral disturbances when re-valuated at 12 years old. Ruben (2000) used data from the US Bureau of Labor Statistics to report that adults with communication disorders may be at an economic disadvantage to those with less severe disabilities. The author explained that this is because more manual labor jobs are being replaced with communication dependent jobs and are therefore those with speech disabilities even more likely to be unemployed or in a lower economic class than people with hearing loss or other disabilities. Thus, prevention and intervention programs for language and communication skills are critical, and should be implemented early to gain the maximum benefits (Rosetti, 2001).

Interventions with Language Development.

In 1966, Bandura and Harris conducted a study with a group of 100 second graders using verbal modeling to teach the children to generate sentences. Verbal modeling is typically an antecedent intervention, where the person implementing the intervention provides an oral example that serves as a discriminative stimulus for the individual to then replicate (Sundberg, 2007). The authors found that neither verbal modeling nor reinforcement alone was sufficient for children to progress in generating

sentences with proper syntax. Rather, the combination of both was necessary for children to progress in their language development.

Hutinger and Bruce (1971) compared verbal modeling to indiscriminate praise in a Head Start preschool program. They experimentally controlled for gender effects and found that although gender did not appear to play a role, the group with verbal modeling performed significantly better than the indiscriminate praise group by generating significantly more adjectives, placing the adjectives correctly more frequently, and constructing more grammatically complete sentences.

Similarly, Ganz, Heath, Rispoli & Earles-Vollrath (2010) compared verbal modeling and the picture exchange communication system (PECS), which is a communication aid used for children with autism spectrum disorder, in a single-case study in a child with autism in a preschool classroom. They compared the two conditions by evaluating picture requests, imitated verbalizations, picture discrimination, and any related speech for a young child. Although Ganz et al. failed to find significant results in either condition, they did note an increase in identifying pictures and related speech while in the verbal modeling phase.

In 2011, Ganz, Flores and Lashley implemented a treatment package of non-contingent reinforcement and verbal modeling with two boys in a school for autism. Using a multiple-baseline-design-across-objects design, where the intervention phase included verbal models and expansion of delayed access to reinforcers (unless the child emitted a request for the item either spontaneously or after the verbal model was presented). Results indicated that both spontaneous and imitated verbal requests increased sequentially in a manner consistent with the design.

Many studies also recognize the role of imitation in language development (Bloom, Hood & Lightbown 1974; Carr & Felce, 2007; Ingersoll & Schreibman, 2006). Rees' (1975) review discussed the varying terminology that has been used synonymously with the term "imitation," and the range of ways people have interpreted the scope of what falls into the category of imitation. In all the studies Rees discussed, there was a common assumption that imitation referred to children imitating the adults' correct verbal syntax. However, little research exists on possible effects of adults verbally imitating, or "reflecting," on children's correct syntax. The studies that do exist have mainly examined mother-infant dyads in naturalistic settings that observed the amount of maternal imitations of the child's sounds (Masur, Flynn, & Eichorst, 2005; Masur & Rodemaker, 1999). Masur and Rodemaker (1999) studied mothers and their babies interacting during bath and play times at 10, 13, 17, and 21 months and found spontaneous imitation to be a large part of mother-infant dyad interactions in naturalistic settings. Masur et al. (2005) observed mothers' frequency of verbal imitations of child's utterances and the frequency maternal descriptions of their child's behavior at 17 months. They found that both of these maternal actions were positively correlated with the number of words their children could say at 22 months. Additionally, the mothers' frequency of intrusive directiveness, which referred to behaviors that took the lead away from the child, was found to be negatively correlated with the size of the children's lexicons.

Neuroscience may provide additional support for the use of verbal modeling and imitation. Schippers, Roebroek, Renken, Nanetti & Keysers, 2010) found that mirror neuron activity in the brain of a person acting out words in a game of charades was

matched by the observers. Acting with gestures is believed to be a precursor to human's use of formal language and the matched brain activity is significant because it supports the idea that the motor concept linked to words is spread from one brain to another via the mirror system (Schippers et al, 2010). In other words, the brain is activated in the same way from watching someone exhibit a behavior as it would be if the person was actually engaged in the behavior himself. In summary, verbal modeling combined with reinforcement has been shown to be effective (Bandura & Harris, 1966; Huting & Bruce; 1971; Ganz et al, 2010; Ganz et al, 2011), and adult verbal imitation of children is a potential resource that has yet to be fully utilized (Masur & Rodemaker, 1999; Masur et al, 2005).

Teacher Training

Teacher training programs have yielded positive outcomes that indicate the potential for teachers to bring about change in their students' behaviors (Koegel, Russo & Rincover, 1977; Ross, 1992; Scheeler, Ruhl & McAfee, 2004; Webster-Stratton, Reid & Hammond, 2004). The literature on training teachers primarily focuses on coaching teachers how to modify their students' problem behaviors (Koegel, et al 1977; Webster-Stratton et al, 2004). These teacher training studies have found that direct coaching with immediate feedback is a key component in effective training (Koegel et al, 1977; Scheeler et al, 2004) and that the amount of interactions between teachers and their coaches is positively correlated with student performance on standardized assessments (Ross, 1992). Additionally, students' behavior is not likely to systematically improve unless the teachers' have been trained to high criterion levels (Koegel et al, 1977). Webster-Stratton et al. (2004) also found that teacher training programs contributed to

treatment effects when added to child training or parent training for children 4 to 8 years old with conduct problems. Speech and language are also forms of behavior. Thus, the same principles should apply to coaching teachers how to modify verbal behavior (Baer, Peterson, & Sherman, 1967)

McIntosh, Rizza, and Bliss (2000) discussed a need for empirically supported treatments in schools and a need for treatment manuals in order to replicate programs, as they built a case to adapt the principles of a well-established parent training program, Parent Child Interaction Training (PCIT), to apply to a teacher training program. Using the name Teacher Child Interaction Training (TCIT), McIntosh et al. (2000) first implemented an adapted version of PCIT in a single-case study in a preschool classroom. TCIT is comprised of two basic training stages, Child-Directed Interaction (CDI) and Teacher-Directed Interaction (TDI). The teachers are first trained on the CDI phase, where the emphasis is on bonding by following the child's lead.

In the CDI phase, teachers are taught the PRIDE skills, which consist of Praise, Reflect, Imitate, Describe, and Enthusiasm. Teachers are taught to praise the children by acknowledging positive behaviors the children are engaged in. Teachers are specifically encouraged to provide the children with "labeled praise" by fully describing the appropriate behavior the child is engaged in. Teachers reflect children's content by verbally imitating children's spoken statements without changing the content of the child's message. Teachers describe by verbally labeling the actions the child is engaging in. The last term, enthusiasm, encourages teachers to exhibit fervor in their interactions with the children.

In addition to using the PRIDE skills, teachers are directed not to criticize, ask questions of the children, or place demands on them during the CDI phase. These behaviors can distract from the child's lead. For example a teacher might ask, "What color is that dog?" The question could distract the child from what he or she was focusing on in the activity, and it places a demand for the child to answer the teacher.

During the TDI phase, teachers are told to use direct commands rather than indirect commands and direct questions as opposed to indirect questions. For example, the teacher should say "Please pick up the book." rather than "Can you please pick up the book?" In the second statement, the teacher means to command the child but is technically asking a question. This makes the statement an indirect command because it is less straightforward.

McIntosh et al. (2000) applied TCIT in a single-subject study design with a 2-year-old African American female who attended an integrated preschool where one first-year teacher was trained. Researchers used the Dyadic Parent/Child Interaction Coding System (DPICS), developed by Robinson and Eyberg (1981) as a clinically practical assessment tool of children's conduct, to measure the frequency of the teacher's behavior descriptions, reflections, imitations, praises, questions, and commands, as well as the child's compliance to commands or responses to questions. Results indicated that the teacher increased the use of descriptive statements, reflective statements, and praise during CDI. In addition, descriptive statements were maintained during TDI. The teacher also exhibited a dramatic decrease of the number of questions asked during the first TCIT session, which she maintained throughout study. The child's compliance to commands

improved during TDI, and there was a decrease in the amount of disruptive behavior when the child transitioned from CDI to TDI sessions.

Filcheck, McNeil, Greco, and Bernard (2004) conducted a TCIT study in an “out of control” classroom with an ABACC' design where baseline meant time out (A), the level system (B), CDI (C), and PDI (C'). The level system is a commonly used classroom condition where children can be placed on various levels based on their behavior, which sometimes determines the level of access children have to certain reinforcers. These researchers implemented TCIT in a classroom with 17 preschool children, 1 female teacher and 1 rotating teacher. The authors employed a full range of measures using DPICS, SOCS (defined by McNeil., Eyberg, Eisenstadt, Newcomb & Funderburk, 1991), Conners' Global Index (a Likert scale measure of disruptive behaviors), classroom manageability scale, time out log, teacher satisfaction measure, parent phone interview, and video tape. In this classroom, the frequency of inappropriate behaviors steadily decreased throughout study (even on return to baseline); with noticeably better results during the CDI, PDI and follow-up phases. The authors described how CDI is a necessary part of TCIT in order for teachers to reduce criticism based on the evidence that criticism levels remained high during the level system phase. Additionally, due to extreme limitations of this study, which included a lack of reversal of behaviors during return to baseline conditions, low number of follow-up observations, use of only one classroom, and no treatment integrity check for PCIT skills, the authors concluded that replications of this research are necessary.

Tiano and McNeil (2006) implemented TCIT with random assignment to treatment or control groups using teachers and students from eight Head Start classrooms.

Tiano and McNeil used the DPICS II (Dyadic Parent/Child Interaction Coding System Second Edition), teacher rating of manageability, time out log, and REDSOCS (Revised Edition of School Observation Coding System). Their results showed that the frequency of inappropriate behaviors was relatively low at the beginning of the study and remained low during post treatment evaluation. Thus, it was hard to detect whether there was a treatment effect. Despite being unable to determine the actual efficacy of PCIT in decreasing inappropriate behaviors in the classroom, their results showed an increase in the amount of labeled praise given by the teachers from three instances per hour to 57 instances per hour in the treatment group. The treatment teachers also utilized time outs significantly less often than the control group teachers. Although incomplete, Tiano and McNeil's results suggest that TCIT training for teachers can indeed contribute to a more positive classroom environment for both teachers and students.

Lyon, Gershenson, Farahmand, Thaxter, Behling, and Budd (2009) implemented TCIT in a multiple-baseline study across four preschool classrooms. Their study aimed to increase teachers' systematic adherence to CDI training. The authors used the DPICS III and found small to moderate improvement.

Components of TCIT Specific to Language and Communication Development:

Behavior Descriptions and Reflections

Within the TCIT training framework, two particular components stand out for their potential value to language and communication development. These elements are behavioral descriptions and reflections. The TCIT training materials describe a behavioral description as:

A statement saying exactly what the child is doing. It is giving a play-by-play of what the child or the child's hands are doing right now or within the past 5 seconds. Descriptions strengthen the child's current behavior by providing attention for it. They are most useful during appropriate behavior and before misbehavior occurs. (The TCIT training materials are available upon request, and the pages are not numbered.)

Thus, during the CDI phase of training, teachers are taught to implement behavioral descriptions by simply describing the behavior they witness the child doing. An example could be, "You are brushing the doll's hair." According to the TCIT manual, the rationale behind behavior descriptions is to allow the child to take the lead and to demonstrate to the child that the therapist is interested. The TCIT training materials also state that behavior descriptions "teach new concepts, model speech, maintain the child's attention on the task, and organize the child's thoughts regarding the activity." (The TCIT training materials are available upon request, and the pages are not numbered.)

The TCIT training materials describe a reflection in the following statement: "A reflection that repeats back what the child has just said with the same meaning. The statement may be extended, shortened, or elaborated." (The TCIT training materials are available upon request, and the pages are not numbered.)

During CDI, teachers are instructed to reflect the children's statements without changing or adding any significant content that would alter the meaning of the statement. For example, the child may say, "My race car is blue." The teacher would then say, "Your race car is blue." Reflections allow the child to direct the verbal exchange, demonstrate that the adult is listening to what the child is saying, establish teacher acceptance and

understanding of the child, advance the child's speech and vocabulary, and increase verbal communication between the teacher and child.

These concepts can also be explained in behavior-analytic terms. Behavior descriptions have traditionally been implemented in the TCIT framework to function as non-contingent reinforcement, where regardless of the child's behavior the teacher describes the child's behavior and provides attention, which may function as a social reinforcer. Behavior descriptions are similar to verbal models, however, their roles in the three-term contingency model vary. Verbal models are typically antecedent interventions, whereas behavior descriptions follow the child's behavior, thus they are consequences (Catania, 2007, pp.278a-278f; Cooper, 2007, p.413). The teacher is tacting the child's behavior, which can be helpful if the child had not previously known the terminology to describe their own actions (Sundberg, 2007).

Similarly, reflections are a form of verbal imitation where the teachers verbally imitate the child, which may function as a social reinforcer and strengthen the likelihood of the child's initiating future verbal interactions. Reflections are a type of echoic verbal operant, which require formal similarity, but not necessarily point-to-point correspondence for the entire phrase. Reflections allow teacher to elaborate on the child's statement and use proper grammar even if the child did not, as long as it does not change the original meaning of the child's statement. This means a reflection could also provide a verbal model similar to the behavior description. This rationale is also consistent with the idea described by Sundberg (2007) when he states that, "The listener not only plays a critical role as a mediator of reinforcement for the speaker's behavior, but also becomes a discriminative stimulus for the speaker's behavior" (p.533).

There is evidence verbal modeling in combination with reinforcement may improve language development (Bandura & Harris, 1966; Ganz et al 2010; Ganz et al 2011; Hutinger & Bruce, 1971) and there is reason to believe that adult imitation of children's oral communication with proper grammar and relevant expansion could improve language development (Masur & Rodemaker, 1999; Masur et al, 2005). The present study specifically assessed teachers' use of behavioral descriptions and reflections before and after receiving training. The aim of this study was to identify if there were any potential gains in language and communication skills from the teachers use of these interventions.

Experimental Questions

- 1: Will teachers increase the occurrence of their behavior descriptions and reflective statements from baseline assessment sessions to post training assessment sessions?

- 2: Will teachers' evaluation ratings of children's use of language and communication related behaviors increase from baseline assessment sessions to post training assessment sessions?

Method

Participants

Participants came from two classrooms containing a total of two lead female teachers and three female instructional assistants and 38 students in total. Each classroom had 18-20 students. The children's ages ranged from 3 to 5 years old. Seventy percent of the students met the criteria to receive free or reduced priced lunch, which is a relevant characteristic because low socioeconomic status is associated with several disadvantages with children beginning school (Lee & Burkam, 2002). For 90 percent of the children, English was a second language (Spanish was the predominant spoken language).

A total of seven female graduate and undergraduate James Madison University psychology students observed the sessions and recorded data. Two doctorate level clinicians were involved with coaching the teachers directly in the classroom.

Setting

This study was conducted in a Virginia elementary school. Both classrooms had a designated area for circle time, as well as seven "centers" for a range of activities. Circle time is a time when the whole class sits together, and teacher directed behaviors are more likely to take place as the entire group is engaged in the same activity such as listening to a story or singing a song. "Centers" is when the children move into separate areas and engage in various activities such as computer time, crafts, or free play with toys. While both CDI and TDI could occur in either area, the majority of CDI occurs during "centers" as the teachers have more opportunity to follow the child's lead during these activities.

The classrooms were approximately 36 square meters.

Materials and Procedure

Training. For several months before the study began, observers were trained for several hours a week with meetings, homework, quizzes, and practice sessions on how to collect data using the Dyadic Parent-Child Interaction Coding System (DPICS). After the observers demonstrated mastery of data collection methods, by demonstrating at least 80% correct on quizzes and practice coding sessions, they visited the schools numerous times before collecting data to allow the children to habituate to their presence.

Design. This study utilized a concurrent multiple-baseline design across subjects, over a period of approximately 4 months. Observers first began observing both classrooms before teachers from either classroom received any training to obtain baseline data. After 4 weeks, teachers from classroom A attended training, while teachers in classroom B continued in the baseline condition. At week 8, classroom B attended the training session. These training sessions lasted 3 to 4 hours and took place in a conference room at the school. At each training session, two faculty members from two different universities led the TCIT training, and university students of varying levels also assisted by engaging in role play scenarios and passing out training binder materials.

The observers did not interact with the teachers or children in any way, but acted merely as “flies on the wall.” Observational sessions took place four mornings a week. Two observers per classroom collected data from 2 minute samples of teacher-child interactions divided into 10-second intervals. Observers listened to an audio clip played on their iPods via headphones to tally behavior occurrences within 10-second intervals.

Additionally, for inter-rater reliability, two observers attached a splitter to a single iPod to ensure they were recording the exact same behaviors during the correct intervals for a minimum of 25% of the observations.

During an observation session, an observer coded behaviors for each teacher. Researchers used a random number generator to randomly construct four observation schedules for each classroom. These four schedules rotated daily.

The coded teacher behaviors included behavior descriptions and reflections, which were behaviorally defined as the following:

Behavioral Description (BD) - a non-evaluative, declarative sentence or phrase in which the subject is the other person and the verb describes that person's ongoing or immediately completed (< 5 seconds) observable behavior or nonverbal behavior.

Reflective Statement (RF) - a declarative phrase or statement that has the same meaning as a preceding child verbalization. The reflection may paraphrase or elaborate on the child's verbalization but may not change the meaning of the child's statement or interrupt unstated ideas.

Additionally, throughout the duration of the study, teachers completed the Devereux Early Childhood Assessment (DECA) to evaluate each of their students' behavior (Naglieri, LeBuffe & Ross, 2013). The DECA aims to assess child resiliency and problem behaviors that can occur in children 2 to 5 years old. This measure is a standardized, norm-referenced behavior scale with overall solid verification of reliability and validity (Naglieri et al., 2013). It uses a five-point Likert scale where responses range

from “never” to “very frequently,” with each individual response receiving a potential value somewhere between 0 and 4. Teachers in this study completed these assessments once a month for the 4 months.

Because the DECA is not designed to evaluate language and communication skills specifically, the researcher had to adapt the use of this measure. Three independent researchers reported which items from the questionnaire could be a relevant indicator of language and communication skills without any knowledge of the other researchers chosen items. The items chosen specifically mention the child participating in some form of positive oral communication. Only the items that were all independently flagged by each reviewer were analyzed in this study. These items included: “try or ask to try new things or activities,” “ask adults to play with or read to him/her,” “say positive things about the future (act optimistic),” and “ask other children to play with him/her.” Cronbach’s alpha for these four items was .74.

Results

Specific items from the DECA were isolated and analyzed to address teachers’ assessments of the children’s language and communication development. These specific items were item 19) “try or ask to try new things or activities”, 22) “ask adults to play with or read to him/her,” 28) “say positive things about the future (act optimistic),” 32) “ask other children to play with him/her.” Table 1 indicates mean scores of the teachers’ responses for those corresponding items for pre-treatment assessment and post treatment assessment.

Paired samples t-tests were conducted to compare DECA scores for each individual item and the four items combined in pre-treatment and post-treatment

conditions. Item 19, Item 22, Item 28, and Item 32 were all significant with p values $< .001$. Additionally, the cumulative DECA score for these four items overall was significant, $p < .001$.

Figure 1 shows the cumulative levels of reflective statements occurring during baseline with a slight increasing trend ($M_{\text{Baseline A}} = 6.80$; $M_{\text{Baseline B}} = 2.96$). During the intervention phase, there was an increase in variability and mean level ($M_{\text{Intervention A}} = 9.85$; $M_{\text{Intervention B}} = 5.71$), depicting after the TCIT training there was a slight visible increasing trend of teachers overall use of reflective statements for both Class A and Class B.

Figure 2 shows cumulative levels of behavior descriptions during baseline conditions ($M_{\text{Baseline A}} = 1.30$; $M_{\text{Baseline B}} = 1.04$). After the TCIT training there was a visible increase of teachers overall use of behavior descriptions for both Class A and Class B, with an increase in mean levels ($M_{\text{Intervention A}} = 5.54$; $M_{\text{Intervention B}} = 3.71$).

Figure 3 depicts the individual teacher data for teachers' use of reflective statements. For Class A, the baseline frequency of reflective statements started out low, ($M_{\text{Teacher 1}} = 2.90$, $M_{\text{Teacher 2}} = 3.50$, $M_{\text{Teacher 3}} = 0.40$), and increased for two of the teachers during intervention ($M_{\text{Teacher 1}} = 4.85$, $M_{\text{Teacher 2}} = 3.08$, $M_{\text{Teacher 3}} = 1.92$). However, there was also an increase in variability of responses in Class A from baseline ($SD_{\text{Teacher 1}} = 2.51$, $SD_{\text{Teacher 2}} = 1.96$, $SD_{\text{Teacher 3}} = 0.70$) to intervention ($SD_{\text{Teacher 1}} = 5.06$, $SD_{\text{Teacher 2}} = 4.08$, $SD_{\text{Teacher 3}} = 2.65$). For Class B, the baseline frequency of reflective statements started also out low, ($M_{\text{Teacher 1}} = 0.75$, $M_{\text{Teacher 2}} = 2.26$), and increased for both teachers during intervention ($M_{\text{Teacher 1}} = 2.36$, $M_{\text{Teacher 2}} = 3.43$). Consistent with Class A, Class B also displayed an increase in variability of responses from baseline ($SD_{\text{Teacher 1}} = 0.79$,

$SD_{\text{Teacher 2}} = 1.76$) to intervention ($SD_{\text{Teacher 1}} = 3.20$, $SD_{\text{Teacher 2}} = 2.10$). The differences in individual teacher responses were minimal with the exception of a few outliers.

Figure 4 shows the individual teacher data for teachers' use of behavior descriptions. For Class A, the baseline frequency of behavior descriptions started out low, ($M_{\text{Teacher 1}} = 0.60$, $M_{\text{Teacher 2}} = 0.50$, $M_{\text{Teacher 3}} = 0.20$), and increased for all of the teachers during intervention ($M_{\text{Teacher 1}} = 1.92$, $M_{\text{Teacher 2}} = 1.88$, $M_{\text{Teacher 3}} = 1.73$). However, there was also an increase in variability of responses in Class A from baseline ($SD_{\text{Teacher 1}} = 0.70$, $SD_{\text{Teacher 2}} = 1.27$, $SD_{\text{Teacher 3}} = 0.42$) to intervention ($SD_{\text{Teacher 1}} = 2.30$, $SD_{\text{Teacher 2}} = 2.36$, $SD_{\text{Teacher 3}} = 2.97$). For Class B, the baseline frequency of behavior descriptions also started out low, ($M_{\text{Teacher 1}} = 0.50$, $M_{\text{Teacher 2}} = 0.48$), and increased for both teachers during intervention ($M_{\text{Teacher 1}} = 2.71$, $M_{\text{Teacher 2}} = 1.14$). Consistent with Class A, Class B also displayed an increase in variability of responses from baseline ($SD_{\text{Teacher 1}} = 0.93$, $SD_{\text{Teacher 2}} = 0.90$) to intervention ($SD_{\text{Teacher 1}} = 2.64$, $SD_{\text{Teacher 2}} = 1.35$). The differences in individual teacher responses were minimal with the exception of a single outlier point for teacher 3 in Class A. It is interesting to note, this outlier occurred on the same day in the same classroom as two outliers also depicted in the reflective statements for individual teachers graph.

Discussion

This study examined the effects of TCIT on teachers' behaviors and well as their ratings of student behaviors. Figures 1 indicate a slight increase in the rate of teachers' use of reflections, while Figures 2 depicts a much more noticeable impact on the increasing use of behavioral descriptions. It is possible the differences are more noticeable for the behavior descriptions than reflections because almost no behavior

descriptions were naturally occurring at baseline level, while there was already some level of reflections occurring before the training sessions. It is possible these baseline differences are related to the naturally occurring verbal interactions between adults and young children. Figure 1 and Figure 2 address the first experimental question, “Will teachers increase the occurrence of their behavior descriptions and reflective statements from baseline assessment sessions to post training assessment sessions?” Teachers in both classrooms exhibited an increased use of behavior descriptions and reflections after receiving TCIT training, which indicates the training program was successful in modifying the teachers’ behaviors.

To address the second experimental question, “Will teachers’ evaluation ratings of children’s’ use of language and communication related behaviors increase from baseline assessment sessions to post training assessment sessions?”, the paired samples T-Test results indicated a significant increase on all four items of the DECA, indicating an improvement of teacher’s ratings for children’s communication and language development skills from baseline to post-treatment evaluations. The improvement in the teachers’ evaluation of the children indicated by scores on the selected DECA items is likely a product of the teacher’s increased use of behavior descriptions and reflections. Thus, an additional benefit from TCIT may be children’s improved language and communication skills.

The terms “language” and “communication skills” can refer to a broad scope of various phenomenon (Sundberg, 2007). Language is often described from biological, cognitive, and/or environmental viewpoints. Cognitive psychology, for example, proposes that language operates via internal processing systems. Some of viewpoints

regarding the definition of language are hard to distinguish as they often overlap. For the purposes of this study the terms “language” and “communication skills” have been lumped together to refer to verbal communication that is used in a functionally appropriate context. The multiple baseline design, in which teachers from the two classrooms were trained at different times, provided experimental control for this study because the teacher’s data did not show changes until the training was implemented sequentially across classrooms.

These results are an extension of previous research findings that verbal modeling in combination with reinforcement may improve language development (Bandura & Harris, 1966; Ganz et al 2010; Ganz et al 2011; Hutinger & Bruce, 1971). Structurally, behavior descriptions and verbal modeling are very similar (Cooper, 2007). Both behavior descriptions and verbal modeling are statements that provide an example of how a phenomenon may be appropriately verbalized. However, behavior descriptions and verbal modeling differ in how they function in the three-term contingency model. Traditionally, verbal modeling has been implemented as an antecedent intervention. The verbal model functions as a discriminative stimulus for a second person to imitate. Behavior descriptions must always follow the present behavior they are referring to, thus they must follow the behavior, and are considered consequences. One goal of TCIT is for the behavior description to function as a social reinforcer, and it is also possible that a behavior description could function as an antecedent for future child verbalizations. For example, if a child is pushing a yellow truck, the teacher could say, “You are pushing a yellow truck.” From that information alone, it is not possible to conclude the behavior description functioned as an antecedent, however, if the child’s next statement was, “I am

pushing a yellow truck,” then the behavior description preceded the child’s verbalization and therefor also served an antecedent role in the three-term contingency model.

These results also provide additional evidence that adult imitation of children’s oral communication with proper grammar and relevant expansion could improve language development (Masur & Rodemaker, 1999; Masur et al, 2005). Imitation is similar to, and could overlap with, mands, however they are not synonymous terms (Cooper, 2007). A mand a verbal operant, influenced by motivating operations, that is followed by reinforcement. Mands are generally used when a subject is requesting an item such as food, for example, which could be influenced by how hungry the subject is. Unlike imitation, a mand is not required to have formal similarity with a model. Additionally, echoic verbal operants are a form of imitation. However, the definition of verbal imitation, otherwise referred to as reflective statements in this study, extends beyond the scope of echoic verbal operants, which require point-to-point correspondence, and simply must have formal similarity with the model.

Behavioral Descriptions and Reflective Statements serve as consequences within the three-term contingency which are likely to function as social reinforcers that increase the probability of children repeating those verbal expressions’ in future interactions. For 90 percent of the students in this study English was not their primary language, and it is possible this combination of intervention techniques with properties similar to verbal modeling and reinforcement provided additional aid to their developing language and communication skills. This study indicates there are potential gains in language and communication skills from the teachers’ use of these interventions.

Limitations

Due to the resources available for this study, the DECA was the best fitting assessment tool researchers had access to in order to evaluate language and communication skills. However, it was not designed specifically to assess language and communication development. Furthermore, the DECA was not a direct behavioral observation of the children but rather a subjective assessment of the teachers. Teachers naturally were aware that they were doing evaluations both before and after their training, thus they were vulnerable to bias.

Future Studies

Although the Cronbach's alpha for the subset DECA questions used in this study yielded acceptable reliability levels ($\alpha = .74$), it would be beneficial for future studies to use additional behavior assessment tools geared specifically toward language and communication development. It would be beneficial to evaluate the children's language and communication skills with more direct behavioral observations, preferably by trained objective observers who were blind to training timelines. Future studies may also be interested in further study for the subset items used in the DECA to see if these items could be beneficial for other to use as an additional subscale while using the DECA.

Additionally, there were some noteworthy differences between the results for reflections versus behavior descriptions. The differences between baseline and post training for behavior descriptions are notably more distinct than reflections. This discrepancy at least partially due to the fact the teachers were already engaging in some level of reflections before training occurred, whereas the teachers were engaging in almost no behavioral descriptions. Furthermore, there were individual differences in teachers' use of reflections and behavior descriptions. It would be beneficial for future

studies to study reflections and behavior descriptions separately and for future studies to examine how to better cater training to teachers individual traits in order to maximize training results.

Clinical Applications

Teachers may find using behavioral descriptions and reflections while interacting with their students may help their students' language and communication development. A particularly opportune time to implement this is when in a setting where teacher instruction is not necessary such as "free play time," where the child is able take the lead in choosing their own activities and conversation topics.

Conclusion

TCIT has an established body of literature, but previous researchers have not specifically focused on TCIT's potential benefits to children's' language and communication skills. This study provides a rationale for why TCIT could also be applied to benefit these skills in young children, as well as evidence that it may in fact do so. Evidence that childhood communication skills are the highest predictive correlation with later intelligence and school performance (Rosetti, 2001) make clear the profound impact that early acquisition of language and communication skills can have on an individual's lifespan. Thus, the optimal development of these skills in young children makes it a significant social issue worth additional research.

Table 1.

Mean DECA Responses for Class A and Class B Combined

(Standard Deviations in Parentheses)

Item Number	Pre-treatment	Post-treatment
Item 19	2.63 (0.72)	3.01 (0.67)
Item 22	2.05 (0.83)	2.51 (1.11)
Item 28	2.18 (0.92)	2.88 (0.84)
Item 32	2.50 (0.77)	3.00 (0.77)
Cumulative	2.33 (0.81)	2.85 (0.85)

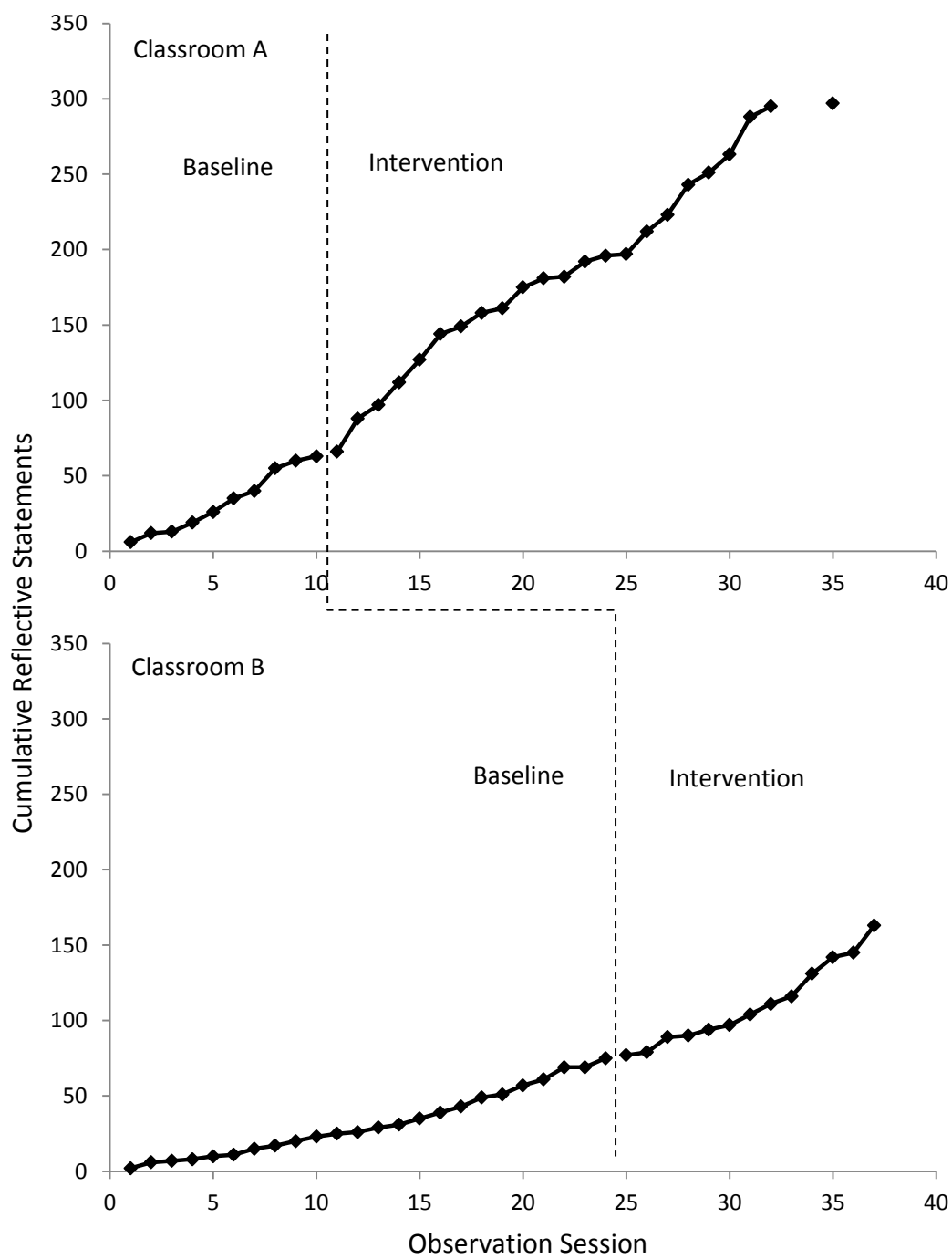


Figure 1. Effect of TCIT Training on Cumulative Frequency of Reflective Statements Made by Teachers

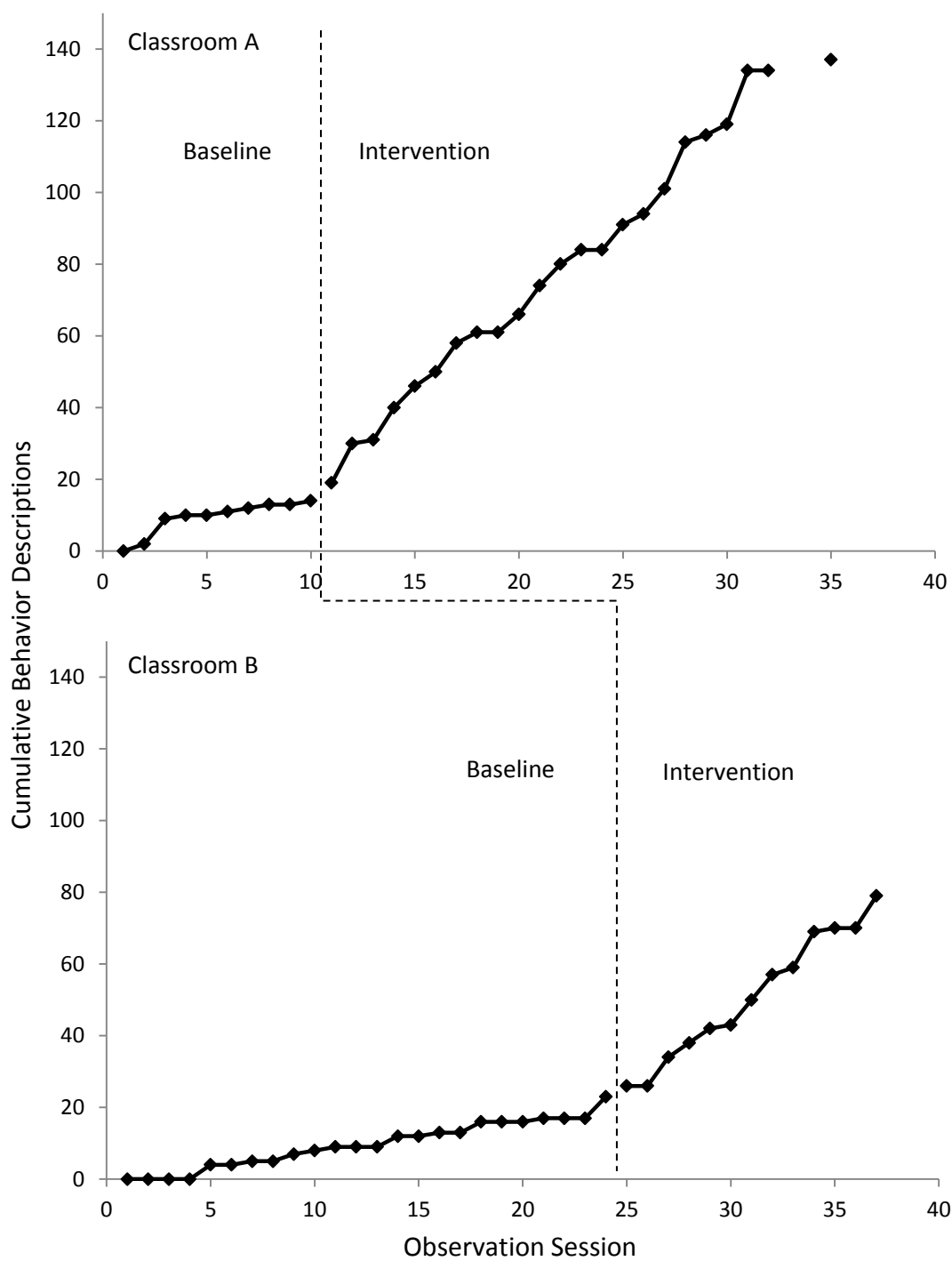


Figure 2. Effect of TCIT Training on Cumulative Frequency of Behavioral Descriptions Made by Teachers

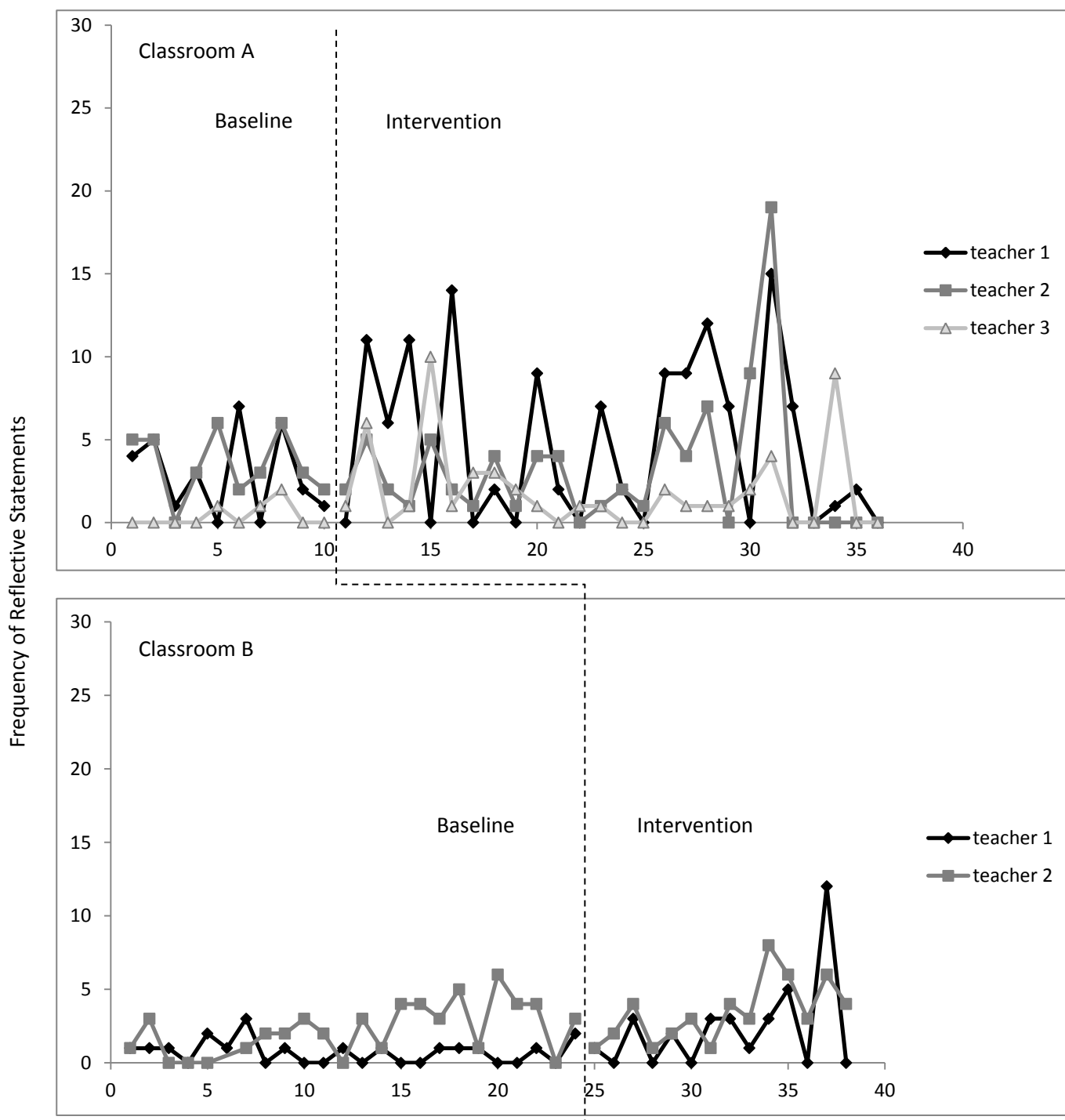


Figure 3. Effect of TCIT Training on Frequency of Reflective Statements Made by Individual Teachers

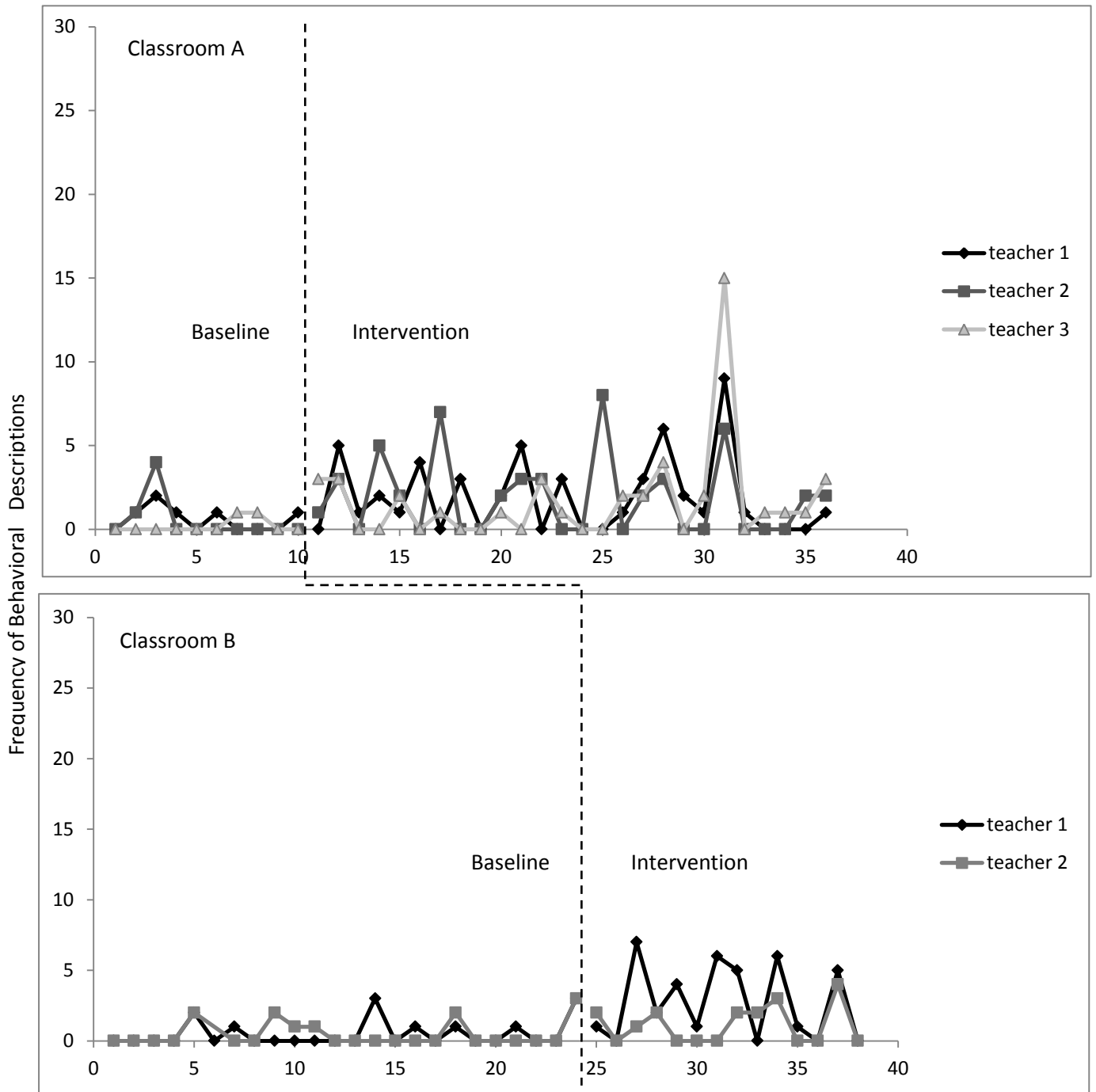


Figure 4. Effect of TCIT Training on Frequency of Behavioral Descriptions Made by Individual Teachers.

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