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Small Group Teaching Strategies for Promoting Acquisition, Generalization, and Maintenance of Functional Communication and Self-Control Skills with Preschoolers

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This paper is submitted in partial fulfillment of the Ph.D. requirements of the Psychology Department at Western New England College

Abstract

Two recent studies (Hanley, Fahmie, & Heal, 2009; Hanley, Heal, Tiger, & Ingvarsson, 2007) demonstrated the efficacy of the Preschool Life Skills (PLS) program for teaching preschoolers social skills as functional replacements for classroom problem behavior such as disruption and aggression. In the current study, we evaluated several enhancements for promoting the generality of the functional communication and self control skill units of the PLS program. In a multiple-probe design across groups, six preschool children were taught to request teacher attention, teacher assistance, preferred materials, and tolerate delays to and denial of those events during child-led, small-group activities. Teaching strategies included instructions, modeling, role-playing, and differential reinforcement of target skills. A 97% increase in target skills and a 100% reduction in problem behavior was observed for the 6 children who experienced the PLS program; no improvements were evident for the 6 peers who also participated in child-led activities but who did not experience the PLS program. A between-groups design showed that generalization of the acquired skills to unfamiliar teachers and classrooms was only achieved for the children who experienced the PLS program and that satisfactory performance was only achieved for these children when a teacher was informed of the teaching strategies and target skills in the PLS program. A moderate level of skill maintenance was observed during a 3-month maintenance assessment, and all children emitted the skills at a high level after the first booster teaching session. Stakeholder responses on a social-acceptability questionnaire indicated that they were satisfied with the targeted social skills, the improvements in the children's social skills, and the teaching strategies that were used.

DESCRIPTORS: delay tolerance, functional communication, generalization, maintenance, preschool life skills, problem behavior, self control, social skills

Small Group Teaching Strategies for Promoting Acquisition, Generalization, and Maintenance of Functional Communication and Self-Control Skills with Preschoolers

Sixty three percent of American children experience non-parental child care prior to kindergarten (Johnson, 2005). With the majority of American children in non-parental child care, questions have been raised concerning its short- and long-term effects on social development (Belsky et al., 2007). For example, the National Institute of Child Health and Human Development Study of Early Child Care (NICHD, 2003) observed 1,058 children from birth to kindergarten and found that the amount of time spent in non-parental child care was highly correlated with teacher and mother reports of low social competence, high interpersonal conflict, and problem behavior such as aggression and disobedience. Rimm-Kaufman, Pianta, and Cox (2000) surveyed 3,595 kindergarten teachers concerning the characteristics of children entering their classroom. Of the teachers surveyed, 30% reported that more than half of the children had problems working in groups, 20% reported that more than half of the children had social skill deficits, and 14% reported that more than half of the children had communication deficits. When asked to identify social skills they considered to be most important for preschoolers transitioning into kindergarten, it is not surprising that teachers identified the abilities to communicate their wants and needs, be non-disruptive, and follow directions as most important (Lin, Lawrence, & Gorrell, 2003), relative to the academic skills of naming colors and shapes, knowing most of the alphabet, and counting to 20, which were rated as very important by the fewest percentage of teachers. Taken together, these findings highlight the importance of evaluating teaching strategies that increase teacher-nominated social skills and decrease problem behavior while also promoting the durability of these improvements over time and across educational transitions.

Low teacher-child ratios (1:7 to 1:10) and limited amounts of materials, common among child-care centers, may present situations in which children compete for common classroom reinforcers such as a teacher's attention and assistance and preferred classroom materials. These situations have been described as evocative (Hanley, Heal, Tiger, & Ingvarsson, 2007) because they establish the value of common classroom reinforcers (Michael, 1993) and because they represent opportunities to assess the type of responses children have learned in specific evocative situation (i.e., whether those responses are appropriate or inappropriate). Responses that are most effective at producing typical reinforcing outcomes during evocative situations (e.g., attention from others, access to classroom materials, escape from challenging tasks, continuance of play, and so forth) are most likely to occur in the future. Unfortunately, these responses may take the form of problem behavior such as forceful grabbing, hitting, and yelling (Ingvarsson, Hanley, & Welter, 2009; McKerchar & Thompson, 2004; Reimers et al., 1993). Such problem behavior may also be learned by observing peers' problem behavior producing access to classroom reinforcers (see Snyder et al., 2008, and Warren, Schoppelrey, Moberg, & McDonald, 2005, for evidence of this phenomenon labeled "deviant peer training").

The most commonly described strategies for addressing the development of problem behavior in child-care centers have included changes to antecedent conditions such as providing duplicates of classroom materials, allowing child-led free-play activities, assuring that schedules are predictable, and freely providing teacher attention (Doke & Risley, 1972; Etzel, 1997; Hart, 1982; Hart & Risley, 1975; Jolivette, Stichter, Sibilsky, Scott, & Ridgley, 2002; Jones, Drew, & Weber, 2000; LeLaurin & Risley, 1972; Pretti-Frontczak, Barr, Macy, & Carter, 2003). These strategies are aimed at avoiding evocative situations that may lead to problem behavior by reducing competition and motivation for common classroom reinforcers. Despite such efforts,

limited amounts of and delays to classroom materials, teacher attention, and teacher assistance will be experienced at some point in child care and early educational contexts, and when they do, children may be no more prepared to appropriately respond if teachers rely exclusively on antecedent strategies (Hanley et al., 2007).

In addition to adopting antecedent strategies to manage children's classroom behavior, Hanley et al. (2007) presented an approach that capitalized on, rather than avoided, evocative situations by using them as opportunities to teach skills that likely served the same function as problem behavior. Teaching a repertoire of functionally equivalent social skills may not only produce the immediate benefit of decreasing problem behavior (e.g., Carr & Durand, 1985), but may also prevent its development or escalation to more severe forms. Hanley et al. designed a class-wide curriculum for teaching 13 social skills and measured the curriculum's effects on skill acquisition, skill maintenance, and problem behavior reduction for a class of 16 preschoolers. The type of skills that were selected was informed by the school-readiness literature as described above (e.g., Lin, Lawrence, & Gorrell, 2003) and the function-based intervention research on problem behavior (Durand & Carr, 1991; Fisher et al., 1993; Hanley, Iwata, & Thompson, 2001; Piazza et al., 1997). This curriculum, referred to as the Preschool Life Skills (PLS) program, focused on teaching four skill units to every child. The four units were instruction following, functional communication, delay tolerance, and friendship skills. The functional communication and delay tolerance (i.e., self-control skills) units directly addressed decreasing problem behavior maintained by common classroom reinforcers. These skill units were also designed to establish the specific social skills preferred by kindergarten teachers such as using appropriate words to communicate their wants and needs (Lin et al., 2003).

During the PLS program, children were taught communication responses that have been

shown to be functionally equivalent to problem behavior maintained by access to teacher attention, teacher assistance, and preferred materials (Carr & Durand, 1985). Responses that specify the reinforcer represent the verbal operant described by Skinner (1957) as a mand. For example, children learned to say "May I have the glue, please" to obtain glue and "Will you help me, please" to obtain assistance opening the glue. These mands likely served the same function as forcefully grabbing the glue and whining about the difficulty in opening the glue. Next, children were taught to tolerate conditions in which access to attention, assistance, and materials were delayed; they were taught to say, "okay" and wait patiently for 30 s to 1 min. Learning how to tolerate delays following acquisition of communication responses benefits both child and teacher because the requested events are not always immediately available in a busy preschool classroom and these waiting periods often evoke excessive manding (Tiger & Hanley, 2004) or problem behavior (Hanley et al., 2007).

The success of the PLS program was clear: the target skills were not observed with most children prior to teaching; a 67% increase in functional communication skills and an 88% increase in the delay tolerance skill were observed after teaching. Hanley, Fahmie, and Heal (2009) increased the reliability and generality of the PLS program by systematically replicating its effects in community-based Head Start classrooms. This study differed from the initial evaluation of the program because it occurred in a community-based preschool (as opposed to a university-based preschool), teachers had a wider variety of training backgrounds, there were lower teacher-child ratios (1:6 to 1:10), and the children had a higher risk for school failure due to their family's low socio-economic status (Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Qi & Kaiser, 2003).

However, further refinement of the PLS program is required before a larger scale

application is conducted to determine its effectiveness in preventing the development of problem behavior. First, not every child learned all targeted skills in previous studies with the class-wide approach. This is of concern because all children who attend non-maternal center-based child care may be at risk for developing problem behavior (NICHD, 2003). Second, of the skills that were acquired, not all maintained during post-teaching observations. Persistence of the skills is necessary to maintain the benefit of decreased levels of problem behavior and potential prevention of more severe forms of problem behavior. Third, achieving acquisition and maintenance is necessary but not sufficient for developing a prevention curriculum. That is, evaluating whether acquired skills *generalize* and persist under different conditions marked by new teachers and classrooms is critical in the development of a skills-based curriculum aimed at preventing the development of problem behavior when children transfer to kindergarten. In sum, improving skill acquisition, programming for generalization across relevant people and settings (e.g., transitioning across classrooms), and showing skill maintenance are necessary prerequisites to questions about the preventative effects of the PLS program.

With respect to achieving generalized performances, Skinner (1953) noted that generalization is not a process that simply occurs *after* teaching but is the product of thoughtful programming *during* teaching. Under the same assumption, Stokes and Baer (1977) described a technology for promoting stimulus generalization of acquired behavior, which can be described as the spread of the effects of teaching on the occurrence of acquired skills across people, settings, and materials not present during the conditions under which the skills were acquired. Stokes and Osnes (1989) followed up with a description of 12 specific tactics for promoting the generality of behavior changes within three categories: (a) make use of current functional contingencies by selecting responses that would likely recruit natural consequences and by

modifying consequences so that reinforcement is provided for newly acquired responses and withheld for non-target responses, (b) teach diversely by using many exemplars of stimuli and responses and by making programmed antecedents and consequences less discriminable during teaching, and (c) incorporate functional mediators by including common physical and social stimuli during teaching and by teaching self-mediated physical and verbal responses.

The PLS program described by Hanley et al. (2007, 2009) incorporated several of the tactics described above to promote generalized performances: (a) responses that were likely to recruit natural reinforcing consequences from teachers were selected (e.g., "Excuse me," "Will you help me, please," and "May I have the item, please"), (b) teaching was carried out by multiple adults and peers, across the entire school day, and during multiple activities to increase the diversity of stimulus exemplars (classroom materials and specific evocative situations), and (c) physical (classroom materials) and social stimuli (peers) were incorporated into teaching situations. These tactics may have increased the likelihood of observing generalization of the targeted skills, but their effects remain unknown because generalization tests were not arranged in either Hanley et al. (2007) or Hanley et al. (2009).

The purpose of the current study was to evaluate the effects of several tactics for generalizing skills to novel conditions. In addition to incorporating generalization tactics similar to those arranged in Hanley et al. (2007, 2009), we evaluated the effects of several additional tactics. With respect to establishing a generalized functional communication repertoire, we taught a set of precursors for the vocal mands (i.e., stopping, looking, and raising hand), and we taught several functionally equivalent vocal mands. These changes were included to increase the likelihood that communication skills would recruit naturally-occurring reinforcing consequences. Moreover, the communication skills were taught across more than 100 different art,

manipulative, and craft activity materials. Toward the same end, the self-control skills were also taught across many activity exemplars and following a variety of teacher cues that delayed the delivery of reinforcers (e.g., "Wait, please" and "In a little bit"). These changes were included to make teaching moments less discriminable to promote the untaught use of the skills under the multitude of situations teachers expect children to wait during school. Children were also taught how to respond appropriately to the denial of reinforcers, which is another common evocative situation that problem behavior may occur. Finally, teaching in a context with several classroom peers, in child-led activity-based format allowed common social and physical stimuli from the children's preschool classroom (and likely future educational classrooms) to be arranged and promote the generality of the acquired skills.

Along with modifications in the targeted social skills and teaching conditions to enhance generalization, assessment and teaching took place in a small-group format rather than a class-wide format, which was used in Hanley et al. (2007, 2009). We intervened with a subset of children nominated by teachers as needing more intense teaching. In this way, we were able to match the extent of our support to the level of need identified by the teachers. This approach resembles the response to intervention (RTI) model applied in elementary educational settings, which determines the intensity of services based on problem severity using a three tier hierarchy. Tiers 1 and 3 represent the ends of the continuum of delivery formats with services provided to either all children in a class-wide format (Tier 1) or to a single child in a one-to-one format (Tier 3). Teaching in small groups is described as Tier 2, which is characterized by discrete learning opportunities for specific skills among several children shown to be less responsive to their classroom's general, class-wide curricula (Gresham, 2004). Therefore, a group-based format is not only appropriate given the number of nominated children in this study, but also provides an

opportunity for the effects of the PLS program to be assessed on a smaller scale.

Hanley et al. (2007, 2009) showed that skill acquisition was functionally related to the children's experience with the teaching strategies using a within-subject multiple-baseline design across skill units. That is, improvements with each skill were observed only after the PLS program was implemented. Although a high degree of experimental control was achieved, on average, older children (19%) exhibited a higher level of skills than younger children (13%) prior to any teaching, and the difference increased in follow-up observations after teaching concluded, with levels at 78% and 65% for the older and younger children, respectively. Hence, the question remains whether these skills would have developed partly as a function of other factors associated with the passage of time such as exposure to educational opportunities at school. In light of the potential role of the benefits associated with time spent in a preschool classroom on social skill development, we thought it important to also arrange a between-subjects design to compare the performance of small groups of children who did and did not experience the PLS program in a shared environment (their classroom).

In sum, the current study replicated the procedures described by Hanley et al. (2007, 2009) and extended this research in five important ways. First, the targeted social skills were expanded to include precursor behavior and multiple functionally-equivalent response forms. Second, additional evocative events were included for each skill (e.g., delay *and* denial situations). Third, teaching occurred during center-based activities with small groups of children nominated by teachers due to a lack of appropriate social skills and to be at a greater risk for developing problem behavior. Fourth, the effects of the PLS program were isolated from the common experience of attending a preschool that may alone influence improvements in social skills via the inclusion of a matched-control group. Fifth, we assessed the extent to which

acquired skills would generalize to novel teachers and classrooms and the extent to which skills would maintain in the absence of experiencing the PLS program for an extended period of time.

Study 1

The effects of the group-based teaching strategies on the acquisition of (a) functional communication skills to obtain adult attention, assistance, and preferred materials, and (b) self-control skills to tolerate delays to and denials of preferred materials and assistance were evaluated within child-led activities. A questionnaire was provided to stakeholders (e.g., preschool teachers, director, and administrators) following completion of the study to assess the social acceptability of the targeted skills, teaching strategies, and change in the children's performance.

Method

Participants and group assignment. Twelve children, six from two different-aged classrooms, attending an inclusive, non-profit preschool participated. All children exhibited developmentally appropriate listener and speaker skills. The children were included in the study because they were nominated by their lead teachers as being most likely to benefit from learning the targeted social skills (see questionnaire in Appendix A). The six top-ranked children from each classroom were split into three similarly-ranked pairs (i.e., first and second, third and fourth, and fifth and sixth), and the children within each pair were randomly assigned to either the test or control group. These procedures were replicated in a second classroom. This procedure of selecting and randomizing children produced two test groups and two matched-peer control groups, with each group composed of three children. All children had been enrolled in full-time non-maternal child care for at least 4 months prior to participating in the current study and spent approximately 7 hrs per weekday at the preschool. Each child's classroom, rank, age,

and group assignment are provided in Table 1.

Setting and materials. Observations took place in a corner area (3 m x 2 m) of the children's classroom, which contained child-sized chairs and a table typically used for center-based activities. During each activity, the children and experimenter were each positioned on one side of the table and engaged with a variety of craft (e.g., collages, popsicle stick houses, cotton ball snowmen), manipulative (e.g., Playdoh®, Lincoln Logs®), and fine-motor activities (e.g., glitter glue, markers, finger paint). Children experienced approximately one to two 15- to 30-min activities, between 9:00 am and 12:00 pm, five days a week.

Dependent measures and interobserver agreement (IOA). Each session consisted of one child-led activity. During each session, activity-related items were presented on the middle of the table (within sight and reach), which defined one type of evocative situation. During each session, the experimenter also signaled the denial and delay of materials and assistance, which defined a second type of evocative situation. Both types of evocative situations were pertinent to teaching the functional communication and self-control skills. Each evocative situation represented one trial during which observers scored the occurrence of problem behavior, less-desirable behavior, or targeted social skills in real-time using paper and pencil (see Table 2 for descriptions of each skill, and see Table 3 for descriptions of problem behavior and less-desirable behavior). Less-desirable behavior was scored on trials in which the child's behavior did not meet the operational definitions of the targeted skills and problem behavior; thus, responses that were scored ranged from approximations of the target skills to responses such as pouting. In addition, the absence of the target skills was scored as less-desirable behavior. If problem behavior or less-desirable behavior and a social skill occurred during the same trial (this rarely occurred), only problem behavior or less-desirable behavior was recorded; therefore, these

responses were mutually exclusive. Less-desirable and problem behaviors were scored throughout baseline and teaching conditions. To increase the likelihood of achieving sufficient interobserver agreement (IOA) measures, several sessions were videotaped for refining data collection.

A second data collector simultaneously and independently recorded target responses during 34% of baseline sessions and 45% of teaching sessions for children in the test group, and 35% of baseline sessions for children in the control group. The distribution of sessions with IOA across all children in the test and control groups was 32% and 30%, respectively. An agreement was defined as recording the same response across the measurement categories during each evocation situation (i.e., trial-by-trial agreement). IOA scores were calculated by dividing the number of agreements by the number of disagreements plus disagreements and multiplying by 100 across all children's performance within a session. Mean agreements averaged 84% (range, 63% to 100%) for Skill 1, 94% (range, 63% to 100%) for Skill 2, and 95% (range, 75% to 100%) for Skill 3. With the exceptions of 6 sessions, the agreement measures were uniformly above 80%.

Procedures

General. A set of materials related to a craft, manipulative, or fine-motor activity was used in each session. The type of activity conducted was based on the availability of materials; however, no activity was repeated consecutively. In each session, the materials were periodically presented near the middle of the table in front of the experimenter. This provided an opportunity to observe the type of responses children would exhibit to access a teacher's attention and to request the materials. In addition, these presentations provided an opportunity to observe the children's behavior when these materials were delayed and denied. Item

presentations continued until each child's responses to access experimenter attention, experimenter assistance, and materials were observed eight times (hereafter described as trials). During two of the eight trials, delivery of the item or delivery of experimenter assistance was delayed; in another two trials, delivery of either event was denied. In summary, an activity ended when each child's behavior was observed during eight evocative trials with four delay and denial trials or when three consecutive evocative trials did not produce additional responses.

During baseline assessments (described below), sessions were conducted only when all three children were present. During teaching evaluations, an attempt was made to have all children present but teaching sessions were conducted if at least two children were present.

Session began when the experimenter said, "Let's start the activity" after describing the activity to the children. In general, each child started with at least one item in front of them (e.g., construction paper). Next, an evocative situation was arranged by placing a single item (e.g., a blue marker) on the table. The experimenter attended to the child who responded first. After the experimenter-child interaction concluded, a second evocative situation was arranged and, again, any of the children had the opportunity to respond. To decrease the likelihood of one child consecutively obtaining the presented items, duplicates (e.g., several blue markers) were presented across some evocative situations. When none of the children responded to obtain the materials within approximately 1 min of their presentation and each child's performance had not been observed eight times, the experimenter provided a group-directed comment such as, "Please remember that you should use all presented materials to complete the activity."

The method of arranging teaching opportunities in this study resembled the "interrupted behavior chain strategy" used by Goetz, Gee, and Sailor (1985) to teach communication skills to students with intellectual disabilities. The similarity is the embedding of teaching opportunities

within commonly experienced activities for skills (e.g., mands for teacher attention) that produce access to reinforcers (e.g., obtaining preferred items) directly related to the ongoing activity. The value of this arrangement is the amount of assessment and teaching moments produced by simply arranging relevant establishing operations, without a high degree of teacher "directedness" (i.e., direct instruction; see Magliaro, Lockee, & Burton, 2005) or supplemental, tangible rewards such as stickers, tokens, and trinkets (Strain et al., 1992).

Baseline. Experimenter attention, assistance, and activity-related items were delivered contingent on problem behavior, less-desirable behavior, or targeted social skills during all evocative situations, excluding evocative situations that involved the programming of delays and denials during which the child's behavior did not influence the availability of the materials during baseline nor teaching conditions. Targeted social skills were also followed by descriptive praise.

Children in the test and control groups participated in the same number and type of activities during the initial (pre-teaching) and final (post-teaching) baselines. Additional returns to baseline were conducted with children in the test group following acquisition of each skill. Completion of baseline was determined by visual inspection of the data.

Teach skill 1: Mands for attention. Children in the test group experienced the group-based teaching strategies (i.e., the independent variable). The pre-activity and within-activity teaching included instructions, modeling, experimenter-child role plays, and feedback for the *mand for attention* skill. The skill required that a child stop what she was doing, look at the experimenter, raise a hand, say "Excuse me," "Pardon me," or "(experimenter's name)," and then wait silently. The evocative situation for attention was arranged by the presentation of materials because obtaining the teacher's attention preceded requests to access materials. Each

child was taught only one of the three vocal mands, but experimenter attention was provided contingent on a child emitting any one of the three vocal mands. Teaching each child only one vocal mand for attention had practical benefits in that the experimenter only had to prompt, model, and role play a single mand, rather than alternating across three mands for each child within each session.

Prior to beginning an activity, instructions on how the skill would result in attention were provided and then each of the skill components was modeled. The experimenter then role played the skill with each child. Descriptive praise was provided if the child emitted a correct skill. Following an incorrect skill, the skill was described, modeled, and role played again with an emphasis on the skill components executed in error (e.g., the child did not look at the experimenter). If an error was committed a second time and the incorrect responses involved motor movements, gentle hand-over-hand guidance was provided to ensure that the skill occurred. After the prompted skill was emitted, experimenter attention was provided (e.g., "Yes, Devin"). Teaching during the activity was similar to strategies present during pre-session, with the exception that the experimenter used one, all, or a combination of the strategies on each trial (see Table 4 for a detailed description of scripts for teaching strategies each skill).

Because the procedures described above were not sufficient to achieve satisfactory acquisition of the mand for attention skill, we introduced additional teaching components. In classroom A, following an incorrect skill, the experimenter withheld attention for that trial (i.e., extinction). This differed from the previous teaching procedures in which attention was merely delayed due to the time required to describe, model, and role play the skill. In classroom B, paper cutouts of an outlined hand were positioned on the table in front of each child. The handprint was arranged to serve as a visual prompt for the component skill of "stopping."

Following an error with "stopping," the child practiced placing one hand on the handprint while raising the other hand. In addition, a second experimenter occasionally modeled the correct skill during the activity. This was done so that the children could observe the differential delivery of attention and descriptive praise. Teaching ended when each child engaged in the skill on 85% of trials or more across three nonconsecutive sessions.

Teach skill 2: Framed-mands for materials and assistance. Pre- and within-session teaching remained in place for Skill 1 while children were now taught the *framed-mands for materials and assistance* skill. For the framed-mands for materials, children were taught to say "Will you give me the (item)" and "May I have the (item)" to access the materials periodically presented on the table after gaining the experimenter's attention. During the activities, materials did not work properly (e.g., a marker was dry, a glue bottle was clogged) or the children had difficulty using the materials (e.g., cutting materials, peeling off the back of stickers). These instances served as evocative situations for the experimenter to teach the framed-mands for assistance by prompting the child to say "Will you help me" and "May I have your help." The same pre- and within-session teaching tactics described previously for Skill 1 were used to teach Skill 2. Teaching ended when both Skills 1 and 2 met criteria described in the previous teaching evaluation.

Teach skill 3: Delay and denial tolerance. After children acquired the mand for attention and the framed-mands for materials and assistance, we attempted to teach them to tolerate delays to and denials of these events. Children were taught to say, "Okay" and return to their activity following a delay or denial cue. Delays were signaled using several cues (e.g., "In a little bit," "Later," and "Wait, please"), and the delays varied unsystematically from 15 s to 45 s for each child (each child experienced one relatively short and long delay per session). During

the delay, the experimenter acted preoccupied by, for example, interacting with another child or preparing additional materials. Denials were also signaled using several forms (e.g., "It's not available," "No, I am going to use that item," and "I am sorry, you cannot use it"), and the item was not available for the remainder of the activity. Pre-session and within-session teaching were the same as that described for Skills 1 and 2. The criteria for skill acquisition differed from previous teaching evaluations; teaching ended when each child engaged in all three social skills on 85% or more trials across five non-consecutive sessions. We modified the criteria to ensure that all skills were simultaneously occurring at high level prior to the final (post-teaching) baseline.

In addition to teaching Skill 3, the form of the mands primarily exhibited by each child during Teach Skill 1 and Teach Skill 2 were identified. Depending on the particular mand form, the other target mand forms were taught via instructions, modeling, role playing, and descriptive praise. For example, if a child primarily said, "Excuse me," we taught the child to say, "Pardon me;" if a child primarily said, "May I have the (item)/May I have your help" we taught the child to say, "Will you give me the (item)/Will you help me." This was done to teach children to independently engage in varied target mand forms, resulting in a larger number of response exemplars (Stokes & Osnes, 1989), in order to increase the likelihood of skill maintenance.

Experimental Design

Within-subject and between-subject experimental designs were used to determine the effects of the teaching procedures. A multiple-probe design across skills was used to determine the effects of teaching on skill acquisition and problem behavior reduction for the six children in the test groups. Re-implementing baseline contingencies after each skill was acquired permitted a within-subject evaluation of the short-term maintenance of the acquired skills and reduction in

problem behavior as a function of the teaching strategies.

By randomly assigning 6 children to the test group and 6 children to the control group, a between-subject design was arranged and allowed for the effects of the entire teaching program to be detected. Children in the test and control groups participated in an identical number of sessions and experienced the same number of evocative situations in each session during the initial baseline (pre-teaching) and the final return to baseline (post-teaching), which permitted a between-group comparison. Play sessions were conducted with the control group throughout the teaching phase for the test group in order to equate the amount of interaction with experimenters and exposure to the same activity-related materials experienced by children in the test and control groups. During these additional control group sessions, descriptive praise was provided following targeted social skills, activity-related materials were distributed noncontingently and equally to the children at the beginning of each activity, and attention in the form of social statements (e.g., we are making made a Playdough® castle) were provided noncontingently throughout session. The noncontingent delivery of materials and attention simulated the use of antecedent strategies that are designed to avoid situations in which problem behavior may occur by reducing competition and motivation for materials, attention, and assistance. The between-groups comparison permitted an evaluation of historical variables other than the teaching strategies such as playing with activity materials, playing with peers, and experiencing high-quality interactions with adults. Variables such as these may produce changes in social skills similar to those observed with children who experienced the programmed teaching strategies. This entire evaluation took 6 months to complete.

Social Validity

We asked stakeholders associated with the preschool to provide close-ended (rating) and

open-ended (comments) responses on the extent to which the targeted social skills, behavior change, and teaching strategies were deemed acceptable or sufficient. The stakeholders included the assistant director of quality assurance for all preschools within the preschool organization, the director of the preschool that we served, the lead and assistant classroom teachers of the classroom we served, and an arbitrarily selected parent of a child that participated.

After being questioned about the goals of the project (i.e., the importance of the skills selected for teaching), stakeholders were presented with three video clips, each 2.5 min in duration. The first video clip showed children's performance from the test group during the pre-teaching baselines; the second video clip showed children's performance during the post-teaching baseline. All the stakeholders were blind to which videos were of the children's pre- and post-teaching performances. The third video clip showed the experimenter implementing all components of the teaching strategies. The video clips showed each of the child's responses during the evocative situations. To avoid any bias in the children's performance that were selected, we included the first evocative situation in which children's behavior could be seen and heard clearly during pre- and post-teaching baselines.

Results

Did the teaching result in skill acquisition for each child in the test group? The performance of the three children in the test groups from classroom A and B across the baseline and teaching conditions are depicted in Figure 1 and 2, respectively. Each child's performance for Skills 1, 2, and 3 are depicted in a separate panel in the order in which the skills were taught. The children are arranged in ascending order based on their pre-assessment teacher ranking. Each closed circle denotes the percentage of trials each skill was observed during an activity; the gray bars denote the number of trials (or evocative situations) in which a child's performance

was scored during an activity.

In Figure 1, the children in classroom A did not exhibit any of the targeted social skills during the initial baseline (pre-teaching). A steady increase in mands for attention (top rows for each child) was observed following implementation of the teaching procedures (Teach Skill 1). After observing skill acquisition for all three children, a return to baseline was conducted. Mands for attention continued in the absence of teaching strategies; the other two untaught skills were not observed. The procedures were then applied to teach framed mands for materials and assistance; rapid skill acquisition was observed (Teach Skill 2; second row). Skills 1 and 2 continued at a high level in the second return to baseline while delay and denial tolerance, which had not been taught, was not observed. Skill 3 was acquired quickly after teaching was implemented (Teach Skill 3; third row). In the final return to baseline (post-teaching), the children continued to engage in the acquired skills at the high level observed during teaching. Similar effects of the group-based teaching were evident with the younger children in classroom B (see Figure 2). Experimental control was demonstrated by showing acquisition across skills when and only when the teaching procedures were applied. This within-subject control was then replicated across the 6 children who experienced the teaching.

Were there performance differences across children in the test and control groups prior to or following teaching? Each of the 12 children's skill acquisition during pre-teaching (first column) and post-teaching (second column) assessments are depicted in Figure 3 as the mean percentage of trials for the last three sessions during the pre- and post-teaching assessments. The organization of these data allow a direct comparison of the average performances with each social skill for children in the test and control groups *prior to* any teaching and *following* completion of teaching. In addition, the magnitude of improvement

between observation periods is reported for each child's by quantifying within-subject performance differences with Cohen's *d* effect sizes. The children are depicted in descending rank from classrooms A (top) and B (bottom) on the y-axis; asterisks denote children in the test group. The mands for attention (black bar), framed-mands for materials and assistance (gray bar), and delay and denial tolerance (hatched bar) skills are depicted as the mean percentage of trials for the last three sessions in the pre-teaching and post-teaching baselines. Prior to teaching, children across both groups performed similarly in that no one exhibited the mands for attention and framed-mands for materials and assistance, and only several children exhibited low levels of delay and denial tolerance. These data provide empirical support, in addition to the teacher's rankings, that children in the test and control group did not differ in meaningful ways with respect to the targeted social skills.

After experiencing group-based teaching, all children in the test group exhibited each skill on a high proportion of trials and, when the skills were aggregated, engaged in the social-skill repertoire in an average of 85% or more of the trials. By contrast, children in the control group who experienced the same activity-related materials and interaction with experimenters--but not the group-based teaching strategies--did not acquire the social skills. Cohen's *d* statistics were calculated to describe the magnitude of the teaching effects on skill acquisition for each child in the test group because it provides a scale-free measure of performance. Each child's mean performance across the skills during the pre-teaching baseline was subtracted from their mean performance during the post-teaching baseline and the difference was divided by their mean of the standard deviations from both baselines. The resulting effect sizes across children were all above 5.0 (range, 5.9 to 20.8), which are considered large effects (Cohen, 1994). An effect size is not reported for Len because there is no variability in his responding during pre-

teaching (0% of trials) and post-teaching (100% of trials) baselines, resulting in a mean standard deviation of zero, which cannot serve as a denominator. Nevertheless, the magnitude of the change in Len's behavior is the largest that can be achieved.

Were there differences in problem behavior across children in the test and control groups prior to and following teaching? A reason for establishing complete skill acquisition was to maximize the likelihood of decreasing problem behavior. The level of problem behavior (black portion of the stacked bar) and less-desirable behavior (gray portion of stacked bar) for all 12 children are depicted in Figure 4 as the mean percentage of trials for the last three sessions during the pre- and post-teaching assessments. Prior to teaching, all children either engaged in problem behavior or less-desirable behavior. Less-desirable behavior comprised the majority of responses observed with children in the control group. This was also the case with four of the children in the test group, with the exception of Abe who exhibited both forms in about half of the trials and Iggy who primarily engaged in problem behavior. Nevertheless, no problem behavior and near-zero levels of less-desirable behavior were observed with all children in the test group after experiencing the group-based teaching. The resulting effect sizes across children were all above - 1.0 (range, -1.5 to - 22.3), which are considered large effects. By contrast, children in the control group continued to engage in either less-desirable behavior, problem behavior, or both. In fact, the relative proportion of trials with problem behavior increased for all children, and Hank, Mia, and Vin engaged in problem behavior on every trial. For 5 of 6 children, the effect sizes with respect to an increase in problem behavior were above 1.0 (range, 1.5 to 27.7), which are considered large effects. An effect size is not reported for Vin for the same mathematical reason described above for Len; the magnitude of the increase in Vin's problem behavior is the largest that can occur. The effect size for the sixth child was 0.2, which

is considered a small effect. In sum, there were varied levels and types of problem behavior across children prior to teaching, but in follow-up observations, children in the test groups did not (or rarely) engage in less-desirable or problem behavior; whereas, children in the control groups engaged in more problem behavior.

To what extent were there statistically significant between-group performance differences prior to and following teaching? Figure 5 shows the performance of each child individually (closed circles) and the mean of all children in the test and control groups (gray bars) for the targeted social skills (top row) and both types of undesirable behavior (second row) during the last three sessions of the pre- and post-teaching assessments. (Problem behavior and less-desirable behavior were collapsed together to comprise undesirable behavior.) The statistical degree to which the groups differed are reported in the context of the data used in the analysis. A two-tailed Mann-Whitney Test (Mann & Whitney, 1947) was used to detect statistically significant differences across groups. The standardized Cohen's *d'* effect size statistic used to describe the magnitude of the difference between children's mean performance in the test and control groups and this statistic differed from the calculation applied to describe within-subject changes. The mean performance of the children in the control group was subtracted from the mean performance of the children in the test group for the last three sessions during the pre-teaching and post-teaching baselines. The resulting sum was then divided by the pooled standard deviation (Lipsey & Wilson, 2001; Myers & Well, 1991; Thalheimer & Cook, 2002).

Near-zero levels of the target skills were observed during the pre-teaching baseline for children in the test and control groups, and there was not a statistically significant difference between the groups. Children also performed similarly with respect to undesirable behavior,

and, again, there was not a statistically significant difference between the groups. Following teaching, however, children in the test group engaged in high levels of the social skills whereas no skills were exhibited by children in the control group. The difference was statistically significant ($U = 36.0$, $^{***}p < .001$) and the effect size was large ($d = 25.0$). There was also a statistically significant difference in the level of undesirable behavior across groups following teaching, with near-zero levels observed with all children in the test group and high levels observed with children in the control group. The difference was statistically significant ($U = 0.0$, $^{***}p < .001$) and represented a large effect size ($d = -46.8$). The teaching strategies produced statistically significant and high magnitude differences in children's performance across the groups.

To what extent were stakeholders satisfied with the skills targeted, improvements in the skills, and the procedures used to teach the skills? Five teachers' individual ratings and the mean of their ratings on the importance of the skills targeted in the study, the sufficiency of the changes in the children's behavior, and the acceptability of the teaching procedures used to produce those changes are listed in Table 5. Ratings on the scale ranged from 1 (strongly disagree) to 7 (strongly agree). All the stakeholders strongly agreed that types of social skills targeted in the study were valuable and would be appreciated in an educational setting (questions 1 and 2; $M = 7$; range, 7 to 7). After watching the children behave during an activity prior to teaching, the stakeholders, on average, were somewhat satisfied with how the children requested the experimenter's attention ($M = 4.4$; range, 3 to 6), experimenter's assistance and materials ($M = 5.2$; range, 5 to 6), and tolerated when materials were delayed and denied ($M = 5.4$; range, 5 to 6). After watching the children behave during an activity following teaching, all of the stakeholders' satisfaction increased; that is, the stakeholders were more satisfied with how the

children requested attention (*M* = 6.6; range, 6 to 7), requested assistance and materials (*M* = 6.6; range, 6 to 7), and tolerated when materials were delayed and denied (*M* = 6.6; range, 6 to 7). Finally, the majority of the stakeholders strongly agreed that the teaching strategies were acceptable (*M* = 6.5; range, 5 to 7) and they would recommend the use of the strategies to other teachers (*M* = 6.8; range, 6 to 7). Open-ended responses for each question are provided in Table 6.

Discussion

The skill acquisition results systematically replicated and extended Hanley et al.'s (2007, 2009) findings by showing statistically and socially significant effects while: (a) teaching in a small-group format, (b) teaching precursor and functionally equivalent responses for the targeted skills, (c) teaching a younger-aged group of children, and (d) achieving consistently high levels of skill acquisition across *all* the children who participated. These results will be discussed in turn. Hanley et al. (2007) implemented the PLS program on a class-wide scale (every child was taught) and, although the program was designed to eventually be evaluated for the prevention of problem behavior, the application served as a primary-tier intervention in the RTI framework. We taught skills in the functional-communication and self-control units of the PLS program to a subset of children in a small-group format, who were nominated by their classroom teacher for additional services. This model of consultation matches the secondary tier of the RTI framework, and the successful application under this condition extends the generality of the PLS program across a different type of assessment and teaching format.

The shift to a small-group format removed some advantages associated with class-wide teaching but also introduced some other advantages. In Hanley et al. (2007, 2009), assessment and teaching took place across various preschool settings throughout the day (e.g., meal time and

free play), which included the use of different materials and participation of several teachers. In the current study, assessment and teaching took place in one setting (center-based activities), with one experimenter, and at a general time (late morning). As a result, the conditions under which teaching took place were less diverse and more predictable than as arranged in Hanley et al. (2007, 2009). At the same, because center-based activities were common to the classrooms' daily schedules, the assessment and teaching conditions were identical to the naturally-occurring activities.

The children who participated in Hanley et al. (2007, 2009), all showed an increase in the use of the social skills in post-teaching assessments, but the extent of acquisition varied. That is, some children did not benefit as much as others. By contrast, in the current study every child exhibited the three skills in over 85% of the opportunities during teaching, and five or six children continued to exhibit the skills in over 80% of the opportunities during the post-teaching assessment (the sixth child exhibited two of three skills above 85%). This finding is notable given that the children were nominated by their teachers due to concerns over their lack of appropriate social skills and levels of problem behavior, and these children may represent the children who were less responsive to the PLS program in Hanley et al. (2007, 2009). One of the reasons for teaching the particular social skills we selected was because they were presumed to be functionally relevant to the variables maintaining problem behavior. During pre-teaching, less-desirable behavior was primarily observed for 11 of 12 children. This finding is similar to Hanley et al. (2007, 2009), in which problems of omission, rather than problems of commission, were observed during the pre-teaching assessments. The similarity in the type of responding suggests that the children's repertoires across the studies were similar, which increases the appropriateness of making comparisons across the studies. The high level of skills and near-

zeros level of problem behavior in the post-teaching assessment provide some support that the skills served as functionally equivalent responses. A low level of problem behavior was also observed with the children who emitted the target skills on the majority of opportunities in Hanley et al. (2007, 2009). The results in the current study highlight the importance of teaching until complete acquisition has been observed to eliminate problem behavior.

Hanley et al. (2007) recommended teaching several functionally equivalent responses per skill and teaching under more types of evocative situations to better prepare children to respond appropriately under the multitude of challenging conditions in early childcare and elementary education settings. We incorporated these recommendations by teaching (a) precursors to the vocal mands for attention, (b) three vocal mand forms to access adult attention and two framed mands to access materials and assistance, and (c) we taught children to respond appropriately during evocative situations in which materials and assistance were delayed *and* denied. All the children acquired the more complex skills, which may have contributed to the robust levels of the skills in the post-teaching baseline.

The enhanced teaching effects in the current study relative to Hanley et al. (2007, 2009) is likely due to the increased "dosage" of teaching (i.e., number of teaching opportunities). The criteria for skill acquisition in Hanley et al. (2007, 2009) was based on time (2 days) and a minimal number of opportunities (10); whereas, performance-based criteria was used in the current study. In Hanley et al. (2007), on average, children were provided with 13 direct-teaching opportunities per skill; by contrast, children, on average, experienced 150 (range, 199 to 251), 68 (range, 56 to 104), and 60 (range, 53 to 71) direct-teaching opportunities for Skill 1, 2, and 3, respectively. The use of performance-based criteria was warranted for several reasons. First, the duration of teaching time during the center-based activities comprised less than 15% of

the children's time at school. The consequences provided for appropriate and problem behavior outside of the small-group format were unknown, but it unlikely that they promoted skill acquisition. Any acquisition effects from observing other children engaging in or being taught the skills outside the small-group format were also absent. Hanley et al. (2007) noted that performance-based criteria are more appropriate for children who would benefit from additional instruction. The results in the current study support the use of performance-based criteria for providing remedial teaching to a subset of children who were identified as likely to benefit from additional teaching opportunities. Hanley et al. (2007) also noted that using performance-based criteria permits flexibility to modify the teaching procedures when necessary. Children in classroom B were younger than nearly all the children that participated in Hanley et al. (2007, 2009). During Teach Skill 1, the three children were not acquiring the skill as quickly as the children in classroom A. To promote skill acquisition, three teaching enhancements were introduced. The ease in which modifications were integrated may serve as model for teaching preschool life skills to other populations of individuals such as children diagnosed with autism spectrum disorders.

The use of within-subject and between-subject designs ruled out alternative explanations for the improvement in the children's performance. The experimental control demonstrated in the multiple-probe design across skills established a high degree of interval validity. The between-groups design allowed the potential effects of other variables not easily isolated using within-subject designs to be controlled such as questions regarding whether children who experienced the same extra-experimental history (typical preschool curriculum) and a similar experimental history (activities composed of adult attention and high quality materials) would learn the social skills and exhibit decreased levels of problem behavior. The between-groups

results show that the social skills did not develop as a function of time spent in a preschool classroom or exposure to center-based activities because these features were equated across the test and control groups. By contrast, learning each skill required arranging specific situations to teach specific child responses to access common classroom reinforcers.

A large shift from less-desirable behavior to problem behavior was observed with the children in the control group from the pre to post assessments, which suggests a potential undesirable effect of predominately using antecedent-based strategies. Following the pre-teaching baseline, children in the control group were provided with similar materials at the start of an activity, allowed to lead the activity (i.e., they could choose what and how to use the materials), and adult attention and assistance was freely delivered. These features were arranged in an attempt to abolish the children's motivation for these reinforcing events and abate problem behavior that may be reinforced by these events. For this reason, the children were not exposed to evocative situations and, therefore, were not taught how to behave under those conditions. The re-introduction of evocative situations during the final baseline (post assessment) after the children had experienced over 50 sessions with these situations essentially avoided appears to have evoked problem behavior presumably because no functionally equivalent skills were learned when materials, adult attention and assistance, and control were historically freely available. The effects of arranging a history of free reinforcement in the current study may serve as an analogue of the situation involving children who experience preschool classrooms that primarily rely upon antecedent-based strategies and transition into an educational context where evocative situations are more likely to be experienced such as teacher-directed grade schools in which these same types of reinforcers are less freely available.

The social validity measures were provided by stakeholders who interacted with the

children on a daily basis (lead teacher, assistant teacher, and parent) and stakeholders who were a part of the preschool organization but who did not directly interact with the children (assistant director of quality assurance and director of the preschool). Nevertheless, similar ratings were provided by the stakeholders. Their ratings only partially corroborated the direct measures of the children's performance during pre-teaching. That is, because the stakeholders viewed children who were nominated by their classroom teacher as warranting additional services, lower ratings of their performance during the pre-teaching activity may have been expected (i.e., ratings less than 4). However, the teacher's scored a 5 or 6 on the 87% of the rating opportunities for the three skills. These results should not be completely surprising because the majority of children's performance, as identified via direct measures, took the form of less-desirable behavior, not problem behavior. Nevertheless, the stakeholders' open-ended responses indicated concerns regarding the lack of more appropriate behavior with comments such as "their behavior is appreciated at school only because the children are in the learning process," "I am somewhat satisfied," "their manners could have been a little better," and "the children were a little inpatient." After viewing the children's behavior during post-teaching, the stakeholders' high ratings corroborated the high levels of social skills identified with the direct measures.

There are several limitations to the current study. First, social validity measures were not collected for children in the control group. This limitation should be addressed in future studies such that social validity measures for test and control groups can be compared. In the current study, it would have been interesting to identify whether stakeholders' ratings and comments would have been consistent with the worsening in behavior (e.g., increase in problem behavior) observed in the post-teaching baseline for children in the control group. Second, data were only collected during center-based activities. Data collection across a broader range of activities and

events throughout the day would provide information on the extent to which the teaching procedures promote generalization in the children's classroom beyond the context of center-based activities. Third, and perhaps the most notable limitation, is the absence of measures on the generalization of the skills across unfamiliar teachers and classrooms and the maintenance of the skills over long periods of time. Obtaining these measures would provide information that is fundamental to the continued refinement of the PLS program before it is evaluated as means to prevent problem behavior. Specifically, measures of generalization would provide information regarding the likelihood that the skills would be observed when children transition to a new teacher and classroom in kindergarten; measures of maintenance would provide information as to whether the skills would likely maintain during the transition from preschool to kindergarten (e.g., summer).

Study 2

Study 1 showed that instructions, modeling, role-playing, and differential reinforcement of target skills were successful in teaching preschoolers several ways to request teacher attention, teacher assistance, preferred materials, and to tolerate delays to and denial of those events during child-led, small-group activities. The purpose of Study 2 was evaluate the extent that the acquired social skills would (a) generalize to child-led activities conducted by unfamiliar teachers in unfamiliar classrooms and (b) maintain over a 3-month period.

Method

Participants, settings, and materials. The participating children, grouping of children, and amount of observations per week remained the same as described in Study 1. In addition, observations occurred in the same corner area of the children's classroom. Generalization activities were conducted in a corner area of several different and unfamiliar classrooms within

the community-based child care center. Because the experimenters and data collectors were associated with acquisition and maintenance evaluations in Study 1, they were not present during any generalization assessments. A hard-disk-drive camcorder was setup on a tripod and was used to record generalization sessions; therefore, all children's performance was scored from the recorded video.

As in Study 1, materials during teaching and generalization activities were provided by the experimenters and varied among craft, manipulative, and fine-motor activities. In addition, the arrangement of evocative situation and implementation of teaching procedures followed those described for Teach Skill 3 from Study 1. During generalization assessments, however, the evocative situations were arranged less systematically, which resulted in a varying number of trials for each child within and across activities.

Five teachers were identified to conduct activities during the generalization assessment based on them not having a history of supervising any of the children in the test and control group and their verbal commitment to lead several child-led activities. Selecting teachers without a history removed the possibility of a teacher history interacting with the children influencing the teachers interactions during the activities. Two teachers conducted activities with the test and control groups in Classroom A, and two additional teachers conducted activities with the groups in Classroom B. A fifth teacher conducted activities across both classrooms. The teachers had an extensive history as lead teachers at the child care center (M = 16 years; range, 5 to 22) and varied with respect to the age of the children they supervised (M = 5.2 years old; range, 3.5 to 6.5). None of the teachers were made aware of the experimental histories of the children with whom they interacted.

Interobserver agreement. A second data collector simultaneously and independently

recorded target responses during 47% of teaching sessions, 34% of generalization sessions, and 31% of the maintenance sessions; the distribution of sessions across all children was above 30%. An agreement was defined as recording the same response across the measurement categories during each evocative situation. Interobserver agreement scores were calculated by dividing the number of agreements by the number of disagreements plus disagreements and multiplying by 100%. Mean agreements averaged 85% (range, 65% to 100%) for Skill 1, 91% (range, 58% to 100%) for Skill 2, and 84% (range, 74% to 100%) for Skill 3. Mean agreement averaged 87% (range, 71% to 100%) for problem behavior and less-desirable behavior. With exceptions in 5 sessions, the agreements measures were above 80%.

Procedures.

Teach all skills. Teaching procedures used replicated those described in Study 1 in which the strategies were applied to teach all three social skills (i.e., Teach Skill 3). Teaching was discontinued when each child engaged in the skills on 85% or more of the trials across three nonconsecutive sessions.

Generalization A (pre-informed teaching). On the days that generalization activities were conducted, the experimenter and data collectors associated with teaching were not seen by the children in the test and control groups. This was done to remove the potential of any stimulus control associated with the experimenters to influence performance. Children in the test and control groups typically participated in generalization activities on the same day and always interacted with identical materials. A minimum of a 24-hr interval separated all generalization activities. The children never experienced the same teacher and classroom in consecutive activities; rather, the activities rotated in a counterbalanced manner across teachers and classrooms.

Prior to each session, the experimenter confirmed with the generalization teacher that the morning schedule permitted her to conduct two activities and, if so, the experimenter prepared the activity. The activity (e.g., making snowmen) and available materials (e.g., glitter glue, cotton balls, raisins, and Popsicle sticks) were described to the teacher and any questions were answered. The teacher was asked to conduct the activity in a way that was most comfortable to her and to interact with the children as was typically done during group-based activities in her own classroom with two exceptions: The teacher was asked to present activity-related materials on the table in front of her rather than distribute them to each child at the beginning of the activity, and the teacher was asked to delay and deny several items to each child throughout the activity. It is important to note the teacher was not told to provide prompts and differential consequences. Two guidelines for concluding an activity were also provided, which included that the activity last for at least 15 min and no more than 35 min and that each child be allowed to create an activity-related product. Upon activity completion, the experimenter reorganized the materials (i.e., replaced and cleaned materials) to maintain consistency of the activity for the second group of children.

Informed teaching. Modifications were made to the arrangement of evocative situations, and to aspects of the teaching after observing the teachers' and children's behavior in Generalization A (pre-informed teaching). The modifications were informed by the observed differences with (a) the presentation formats of activity-related materials (i.e., first type of evocative situation), (b) the form of cues used to signal the delay and denial of materials and assistance (i.e., second type of evocative situation), and (c) the consequences provided for correct skill occurrences. The differences were identified through open-ended observations of the videotaped teachers' behavior during the generalization activities (Bijou, Peterson, & Ault,

1968).

The teachers varied the presentation of materials across formats that involved a single item (e.g., a tube of finger paint), several similar and dissimilar items (e.g., several tubes of finger paint and foam stamps), and all the items for the activity. The latter two formats resulted in evocative situations that were markedly different from the formats arranged during previous teaching evaluations, which comprised presentations of a single item or several identical items. To address this discrepancy, the format of presenting materials during evocative situations alternated across sessions. The alternating formats took the form of presenting a single item, several similar and dissimilar items, and all the items for an activity. The order of the formats was counterbalanced across activities.

To indicate that materials or assistance was going to be delayed or denied, the teachers provided vocal and non-vocal cues that differed from those provided during previous teaching evaluations. The teachers' vocal and non-vocal cues were less clear such as, "One sec," "I don't know," "We'll see," or the teacher simply shaking her head, and the cues were occasionally delivered without looking at the child. Although the experimenter in previous teaching evaluations varied the form of vocal cues such as, "In a little bit," "Wait, please," "It's not available," and "No," they remained fairly consistent and were explicitly directed toward the child. In response to these differences, the experimenter interspersed vocal and non-vocal cues that were less clear and delivered without eye contact among the more consistent cues.

When a child correctly exhibited Skills 1 and 2, teachers at times did not respond to the child or responded to the child after delay (i.e., approximately 5 s to 30 s). During previous teaching evaluations, by contrast, the experimenter immediately (i.e., within 2 s) attended to the child (Skill 1) or provide the materials or assistance (Skill 2) following the correct skill. In other

words, there was always an immediate change in the experimenter's behavior following a child's response. To prepare children for intermittent consequences of the social skills and unsignaled delays and denials, two teaching modifications were introduced. First, at least a 5 s unsignaled delay always occurred prior to any change in the experimenter's behavior following a correct skill and the delays varied, approximately 5 s to 30 s. Also, following approximately one correct skill per activity, the experimenter did not respond. We taught the children a mediating skill to facilitate tolerance in these instances (a similar skill was taught in Hanley et al., 2007). The skill involved engaging in the vocal response, "When I wait quietly, I get what I want" and after three repetitions to return to the activity. Following acquisition of the mediating skill, the experimenter prompted the children to repeat the vocal response at a progressively lower volume level until it occurred silently.

These teaching modifications can be characterized by Stokes and Osnes's (1989) generalization category of "train diversely" (related to Stokes and Baer's, 1977 "train loosely"). The category is composed of 4 tactics, and two tactics involve teaching in the presence of a sufficient number of stimulus exemplars (i.e., activity-related materials) and response exemplars (i.e., teaching precursors and several mand forms), which were incorporated into previous teaching evaluations. The two other tactics involved making the antecedents prior to teaching less discriminable (i.e., the presentation formats and experimenter cues) and also making the delivery of consequences less discriminable (i.e., unsignaled delays and denials following correct skills). The modifications in this teaching evaluation were made to specifically incorporate the latter two generalization tactics. Teaching was discontinued when each child engaged in the skills in 85% or above of trials across five nonconsecutive sessions.

Generalization A (post-informed teaching). This assessment was the same as the

Generalization A (pre-informed teaching) except that it took place following the test group children's experience with the Informed Teaching evaluation. It served as an assessment of whether the teaching modifications improved generalization.

Generalization B. The classroom areas and the materials were similar to that experienced in Generalization A. The difference was that a new, unfamiliar teacher conducted activities after a brief description of the teaching procedures was provided. The same strategies used by the experimenter in previous teaching evaluations were implemented by the generalization teacher with the exceptions that no pre-session teaching occurred. The following description and instructions were provided to the teacher:

> "We taught children how to request a teacher's attention by stopping what they are doing (experimenter modeled his hand being still on the table), looking at the teacher with their eyes (experimenter modeled directing his head and eyes toward the teacher), raising their hand at or above head level (experimenter modeled both correct responses), saying 'Excuse me,' 'Pardon me,' or the teacher's name, and then waiting for the teacher to respond by remaining quiet (experimenter modeled a vocal response and correct waiting). After they gain your attention, they learned to say 'May I have the (item)' and 'Will you give me the (item)' to request activity-related materials and to say 'May I have your help' and 'Will you help me' to request your assistance. A correct request for material usually occurs without them grabbing the materials. When materials are delayed and denied during an activity, they learned to say 'Okay' and return to playing without engaging in additional requests.
>
> If a child does not use the skills at any point in the activity, please prompt the child to engage in the skill by saying, for instance, 'When you want a teacher's attention

make sure you look at them with your eyes;' you may model the correct response by turning your head and looking at the child; and you may role-play the skill by saying, 'Let's practice, when you want a teacher's attention stop what you are doing, raise your hand, look at the teacher, say 'Excuse me' 'Pardon me' or my name and wait for the teacher' followed by the child practicing the skill. When a child correctly requests your attention, materials for the activity, your assistance, or appropriately responds when materials are delayed or denied, you may provide descriptive praise such as, 'Nice job stopping, looking, raising your hand, saying 'Excuse me', and waiting.' The teaching strategies are flexible in that you could use them singly, collectively, or in a combination as you see appropriate. Let's practice the teaching strategies for each skill."

After role playing each teaching strategy (2 min), the teacher was then asked if she had any questions. Feedback on implementing the teaching tactics was provided after the experimenter watched the activity via the recorded video. The feedback took approximately 3 min and included reminders that (a) the children were taught how to wait for the teacher to respond following a request for a teacher's attention, (b) when role playing with the children, it is important to reenact the situation in which the error occurred, and (c) the materials can be presented in a way that is most comfortable to you, but the distance of the materials from each child should be approximately the same. This generalization assessment was not conducted with the children in the control group.

3-Month Maintenance. Our maintenance evaluation measured the extent to which the social skills, less-desirable behavior, and problem behavior were observed 3 months after Generalization B was completed. The teacher who participated in Generalization B also conducted activities in this assessment and was asked to lead activities as described for

Generalization B. However, the teacher was asked to not implement the teaching procedures and instead only deliver descriptive praise following the occurrence of the social skills. Descriptive praise was programmed because (a) the teacher was aware of the skills due to participating in Generalization B and (b) the contingencies matched those arranged in the pre-teaching and post-teaching baselines in Study 1. For this reason, the children's performance in this assessment provided a measure of the extent that their history of teaching would lead to maintenance of the social skills. It should be noted that the lead teachers of children's classrooms were not informed of the teaching procedures and target social skills; therefore, the children did not have experience with the teaching procedures during the 3 months preceding this assessment. One child from each of the classrooms (Joy and Tex) could not participate in maintenance and 3-month teaching conditions because they transferred to a different school.

3-Month Teaching. Following the 3-Month Maintenance assessment, an experimenter provided the same instructions, role play of the teaching strategies, and feedback on how to conducting activities as described in Generalization B to the teacher. This evaluation was conducted to determine how rapidly the children's use of the social skills could be reestablished with the use of the teaching procedures.

Experimental Design

A between-subjects (group) design was used to evaluate differences between children's performance in the test and control group across unfamiliar teachers and classrooms during Generalization A assessments (pre- and post-informed teaching). A multiple-baseline design across classrooms was used to determine the effect of the teacher's behavior on children's performance during Generalization B.

Results

To what extent did the original teaching and informed teaching result in skill generalization and maintenance for each child? The effects of group-based teaching on generalization and maintenance are depicted for children from classrooms A and B in Figures 6 and 7, respectively. The performance of each child for Skills 1, 2, and 3 are depicted across three separate panels. For children in classroom A, all three skills were observed on 85% or more of trials during the initial teaching phase (Teach All Skills). Generalization A (pre-informed teaching) was then conducted, during which an immediate decrease to near 50% was observed for mands for attention and delay and denial tolerance, and a decreasing trend was evident after several sessions for framed-mands for materials and assistance. Moreover, at the end of Generalization A, near-zero levels of Skill 1 and Skill 3, along with a slightly higher level of Skill 2, were observed. In classroom B, Tex and Brit performed similarly to the children in the other test group; Len, however, maintained moderate to high levels of Skill 1 and Skill 2 throughout the assessment.

To remediate the lack of generalization, children experienced teaching conditions that more closely approximated the type of interactions likely to be experienced during the generalization activities (Informed Teaching); for both groups of children, the skills occurred at a high level during the teaching condition. Next, Generalization A (post-informed teaching) was conducted to observe whether the informed teaching procedures would lead to a greater degree of generalization. An immediate decrease in Skill 1 was observed again for Iggy and Joy in classroom A and Tex and Brit in classroom B; however, elevated but variable responding was observed with Abe and Len in classroom A and B, respectively, which indicates a slight improvement in some of the children's performance. A marked improvement in generalization for Skill 2 was evident for all three children in classroom A, with their performance near or

above 80% in the latter sessions of the assessment. A similar degree of improvement, however, was not observed with Tex and Brit in classroom B; whereas, Len showed the same high level of generalization as in the first generalization assessment. All children showed low or highly variable use of Skill 3. Whether the modest improvements in the second Generalization A assessment are due to the modifications in the Informed Teaching condition or simply the additional teaching opportunities is unknown.

Although improvements were observed for Skill 1 and Skill 2 with several children, the degree of generalization was less than satisfactory because all three skills did not occur at consistently high levels. The lack of generalization is a concern because robust effects are required for the PLS program to ultimately prevent the development of problem behavior when children transition across educational settings. Generalization B differed from the two previous assessments because the teacher implemented the teaching strategies during the activity; we saw marked improvements in performance for all children in this condition. Four of six children exhibited Skill 1 in nearly 85% of trials; Iggy and Tex showed improvement but to a lesser degree, with Skill 1 occurring in approximately 50% of trials. All children exhibited Skills 2 and 3 at a high level.

The extent to which a history of experiencing the teaching strategies would result in maintenance of the skills after 3 months without teaching was assessed (3-Month Maintenance). Three of the four children assessed exhibited elevated levels of Skill 1 (above 50% of trials), which were similar to or slightly lower than their performance during Generalization B; the fourth child, Iggy, exhibited the skill at a low level. Three of four children exhibited robust levels of Skill 2 (on nearly 85% of the trials); Brit, however, rarely exhibited the skill. Following the same pattern, three of four children exhibited high, albeit initially variable, levels of Skill 3;

whereas, Abe exhibited the skill at a low level. In summary, all four children exhibited moderate to high levels of at least two of the three skills, indicating partial skill maintenance within and across children. To ensure that each child exhibited all skills at a satisfactory level, the teacher implemented the teaching procedures (3-Month Teaching). High levels of the skills were observed for all children at the close of the assessment.

Were there differences in skill generalization and maintenance across children in the test and control groups? All 12 children's performances during the last three sessions of each generalization assessment are depicted in Figure 8. All children in the test group showed a worsening in performance during the first Generalization A assessment (albeit only a minor decrease in Skills 1 and 3 for Len). In particular, Skills 1 and 2 decreased to a low level for 5 of 6 children. Nevertheless, their performances were markedly higher than children in the control group, who did not exhibit any of the skills. After children in the test group experienced Informed Teaching, 5 of 6 children showed minimal to moderate improvement with Skills 1 and 2 in the second Generalization A assessment. Less overall improvement was observed with Skill 3, with only three children (Iggy, Brit, and Len) showing some improvement. By contrast, children in the control groups did not exhibit any of the social skills. Children in the test group participated in Generalization B and the skills that were previously occurring at a low level increased. Skill 2 occurred on or above 85% of trials across all children; Skills 1 and 3 also occurred at higher levels but with more variability across children. During the maintenance assessment, Skill 2 was observed on nearly 85% of trials for all children, which provides some evidence that this skill may be particularly durable. Children also engaged in one of the two other skills on 50% or more of the trials.

Were there differences in problem behavior and less-desirable behavior across

children in the test and control groups during the generalization and maintenance assessments? As shown in the first column of Figure 9, near-zero levels of problem behavior and less-desirable behavior were observed by children in the test group during the post-teaching assessment. During the first Generalization A assessment, both categories of behavior accounted for nearly 50% or more of five of six children's responding. Although these levels are unsatisfactory, they represent an improvement over the higher levels of problem behavior and less-desirable behavior exhibited by children in the control group. During the second Generalization A assessment, a decrease in less-desirable behavior was observed for Joy, Tex, and Brit and a decrease in problem behavior was observed for Abe and Brit; nevertheless, problem behavior was observed again for 5 of 6 children in the test group. In comparison, the children in the control group exhibited higher levels of problem behavior or less-desirable behavior.

In Generalization B, problem behavior and less-desirable behavior were eliminated or decreased to near-zero levels for 5 of 6 children in the test group. During the 3-Month Maintenance assessment, levels of less-desirable behavior and problem behavior remained low for all participants except Brit, who engaged in a high level of less-desirable behavior. Of the four children who participated in the maintenance assessment, problem behavior was nearly eliminated for three of four children. The elevated levels of less-desirable behavior that were observed for the fourth child were reduced in the subsequent teaching evaluation (3-Month Teaching).

To what extent were there between-group differences for the social skills and undesirable behavior across the generalization and maintenance assessments, and were those differences statistically significant? Figure 10 shows the performance of each individual

child as well as the mean performance of all children in the test and control groups during the last three sessions of the generalization and maintenance assessments. A higher level of the social skills was observed with children in the test group (25% of trials) relative to children in the control group in the first Generalization A assessment (0% of trials). The difference was statistically significant ($U = 36.0$, $^{***}p < .001$) and the effect size was large ($d = 2.2$). Children in the test group also engaged in a lower level of undesirable behavior, and the difference was statistically significant ($U = 0.0$, $^{***}p < .001$) with a large effect size ($d = -2.8$). In the second Generalization A assessment, a further improvement in the social skills was observed with children in the test group (51% of trials) relative to children in the control group (0% of trials); again, the magnitude of the difference was statistically significant ($U = 36.0$, $^{***}p < .001$) and the effect size was large ($d = 3.5$). In addition, a lower level of undesirable behavior was observed with children in the test group (27% of trials). The difference between groups was statistically significant ($U = 0.0$, $^{***}p < .001$) with a large effect size ($d = -5.8$). During Generalization B, on average, the children engaged in all of the skills in 81% of trials and engaged in undesirable behavior in only 10% of trials. The teaching strategies produced statistically significant improvements in skill acquisition and undesirable behavior reduction across groups during every generalization assessment, with the magnitude of the difference increasing across each assessment. During the maintenance assessment, the skills were observed, on average, across the children on slightly more than 50% of trials; the level of undesirable behavior increased from Generalization B, but the increase was influenced largely by one child's responding. Similar to the effects observed during Generalization B, high levels of the target skills and low levels of problem behavior were observed during the 3-Month Teaching evaluation.

Discussion

Study 2 was conducted to assess the effects of the teaching conditions on the generalization and maintenance of a subset of the skills taught in Hanley et al. (2007, 2009). Generalization of the skills was observed in the first two sessions of Generalization A (pre-informed teaching). In fact, of the 18 total opportunities to measure the children's performance (six children times three skills), a skill was observed on more than 80% of trials for 12 (67%) of the measures in at least one of the first two sessions. Furthermore, a skill was observed on at least 40% of trials for 15 (83%) of the measures across both sessions, and this pattern continued in the third session for 9 (50%) of these measures. By contrast, none of the targeted social skills but elevated levels of less-desirable behavior and problem behavior were observed across the children in the control group.

Experimental control over generalization was demonstrated by arranging the same type of center-based activities for children in the control group but without the teaching strategies. The between-groups comparison allowed for the effects of the strategies to be isolated from historical variables within the study (center-based activities with high-quality materials and adult interaction) and variables separate from the study that comprised the children's shared environment (e.g., same preschool classroom settings, peers, and teachers). Moreover, due to the use of a between-groups design, obtaining within-subject baseline measures of children's performance in the targeted generalization contexts was not necessary. Therefore, the children's first interaction with the generalization teachers and their classroom was during the generalization assessment; this type of assessment simulates children's experience when they transition between educational contexts (e.g., preschool to kindergarten; kindergarten to elementary school).

Maintenance of the target skills across an extended period of time is also fundamental to the success of a large-scale evaluation on the preventative effects of the PLS program. Hanley et al. (2007, 2009) conducted post-teaching observations of children's performance, but they occurred shortly after teaching was discontinued; we conducted post-teaching observations 3 months after teaching was discontinued. The results were encouraging in that the children in the test group exhibited two of three skills on more than 50% of trials across four consecutive sessions. Taken together, the generalization and maintenance results are encouraging in that the teaching conditions may have led to (a) stimulus generalization of the social skills across different teachers and classrooms and (b) sufficient maintenance for two of the three targeted skills for each child over a 3-month period. Conclusions regarding the maintenance effects are tentative due to the lack of experimental control.

Although moderate to high levels of generalization were observed in the first two sessions for the majority of children in the test group during the first generalization assessment (Generalization A pre-informed teaching), the effects were fleeting, and decreases in the skills were associated with increased levels of problem behavior. Furthermore, improvements were not observed in the second generalization assessment (Generalization A post-informed teaching), despite the fact that over 20 additional teaching sessions were conducted in which antecedents and consequences during teaching were less discriminable. Satisfactory levels of generalization were achieved only after a teacher was informed of the target skills and teaching procedures (Generalization B), which suggests the importance of arranging reinforcement for the social skills and extinction for problem behavior in subsequent educational environments. Future research should evaluate the effects of teacher training within an experimental design to increase the confidence of the findings observed in the current study.

The necessity of training teachers may be viewed as an unquestionable component to include in a program aimed at promoting generalization and maintenance of children's skills. However, we did not initially include teacher training because we were interested in the extent to which teaching children appropriate nonverbal (stop what they were doing, look at the teacher, and raise their hands) and verbal ("Pardon me;" "Excuse me") responses to communicate their wants and needs would naturally recruit reinforcing consequences from preschool and kindergarten teachers. In fact, Stokes and Baer (1977) and Stokes and Osnes (1989) recommend teaching culturally relevant skills as a core generalization tactic, and Lin et al.'s (2003) research on school readiness found that kindergarten teachers, based on their ratings, were primarily interested in children's social skills. Moderate to high levels of the skills occurred in the initial couple of sessions, providing ample opportunity for the teacher's to reinforce these responses. The gradual decrease in the skills suggests that the skills did not recruit a sufficient amount of reinforcement. Perhaps our presumption that the forms of the social skills would be preferred by teachers was wrong. On the other hand, the high ratings and complimentary open-ended responses by the stakeholders indicate that the targeted socials skills were appreciated. The lack of programmed extinction for problem behavior probably contributed the most to the unsatisfactory outcomes in the Generalization A assessments; Hanley et al. (2009) also commented on the likelihood that intermittent reinforcement for responses other than the target response may have moderated the post-teaching effects of the PLS program. Furthermore, in an analog analysis of the relative effects of treatment integrity errors, Peter-Pipkin, Vollmer, and Sloman (2010) found detrimental effects when problem behavior produced reinforcement (errors of commission) but not when appropriate behavior went unreinforced (errors of omission). Future research should determine whether informing teachers to withhold reinforcement

following less-desirable behavior and problem behavior would boost the generalization outcomes.

Given that extinction was not programmed and the teaching procedures were absent in both of the Generalization A assessments and the maintenance assessment, the controlling variables for the children's improved performance during the maintenance assessment requires discussion. In the maintenance assessment, the teacher was asked to reinforce skill occurrences, whereas this instruction was not provided to the teachers in the Generalization A assessments. As a result, the contingency for appropriate behavior likely maintained the skills throughout the assessment. Given that the teacher in the maintenance assessment also conducted Generalization B, the children's history of experiencing her deliver differential consequences may have also contributed to the improved performances.

In addition to training teachers on the target skills and teaching procedures to increase generalization, peer mediation strategies could be used to facilitate generalization. Beaulieu, Hanley, and Roberson (2010) used peer mediation as a tactic to improve the maintenance of 3- and 4-year-old children's use of precursor responses for individual and group instructions in a small-group format. The precursor skill required that a child stopped playing, looked at the teacher, said, "Yes," and waited for the teacher's instruction following the teacher saying the child's name or saying, "Everyone." The peers who provided feedback were taught to mediate their peer's behavior through instruction, modeling, role playing, and descriptive praise. The peer mediation tactic facilitated the maintenance of the precursor responses following discontinuation of the teaching procedures. Peer tutoring should be evaluated as a tactic to increase the generalization and maintenance effects with the skills targeted in the current study.

Conclusion

Studies 1 and 2 were designed to extend Hanley et al.'s (2007, 2009) applications in specific ways. The results of Study 1 systematically replicated the use of teaching strategies in a small-group format with performance-based criteria to teach a flexible repertoire of functional communication and self-control skills that were associated with the near elimination of problem behavior. The results of Study 2 extended previous research by providing preliminary information on (a) the extent to which acquired skills would generalize and maintain across novel teachers and classrooms, and (b) the necessity of a teacher being aware of and providing differential consequences for taught skills.

The use of a between-groups design in both studies allowed additional threats to internal validity to be assessed, which increased the validity of the conclusion that the teaching strategies were responsible for skill acquisition and skill generalization. In addition, the potential that the increase in problem behavior observed with the children in the control group during the post-teaching baseline was due to a history of reinforcers provided noncontingently, suggests the risks associated with antecedent strategies for promoting acceptable behavior in preschools and the importance of evaluating the PLS program as a preventative application. The current study also describes a method for providing teaching opportunities that could be used with children who are less responsive to the PLS program when delivered on class-wide basis. In sum, the results of the study compliment Hanley et al.'s (2007, 2009) applications and may inform particular features of a larger-scaled evaluation of the preventive efficacy of the PLS program.

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Table 1
Children's Rank, Age, and Group Assignment

Children	Rank	Age
Classroom A		
Test Group		
Iggy	#2	4.8 years
Joy	#4	4.8 years
Abe	#6	4.6 years
Control Group		
Hank	#1	5.0 years
Mia	#3	5.0 years
Vin	#5	4.7 years
Classroom B		
Test Group		
Tex	#1	3.8 years
Brit	#4	3.3 years
Len	#5	3.3 years
Control Group		
Alice	#2	3.2 years
Kirk	#3	3.6 years
Jon	#6	3.3 years

Table 2
Operational Definitions of Targeted Social Skills

Skills	Operational Definition
Mands for Attention (Skill 1)	
1. Stopping (precursor behavior)	Hands not engaging with activity-related material prior to, simultaneously with, or within 3 s following a target vocal mand.
2. Looking (precursor behavior)	Head and eyes directed toward teacher prior to, simultaneously with, or within 3 s following a target vocal mand.
3. Hand Raise (precursor behavior)	Hand raised equal to or above head prior to, simultaneously with, or within 3 s following the vocal mand.
4. Vocal Mands	Saying "Excuse me," "Pardon me," or "(teacher's name)" using appropriate tone, volume, and tempo.
5. Waiting for Teacher Attention	The absence of additional mands for attention until a non-vocal (i.e., head turned toward child), vocal (i.e., "Yes"), or both occur.
Framed-mands for Materials and Assistance (Skill 2)	
6. Vocal Framed-Mands	Saying "May I have the (item)" or "Will you give me the (item)" using appropriate tone, volume, and tempo to access material on the table. Saying "May I have your help" or "Will you help me" to access assistance from the teacher.
Delay and Denial Tolerance (Skill 3)	
7. Delay and Denial Acknowledgement	Saying "Okay" using appropriate tone, volume, and tempo following a teacher's signal.
8. Waiting	The absence of additional mands for materials and undesirable non-vocal behavior (e.g., frowning) with or without returning to play with activity-related materials.
9. Mediating Response (taught in Study 2 during Informed Teaching)	Saying, "When I wait quietly, I get what I want" following the mand for attention and framed-mands for materials and assistance skills and then returning to the activity after three repetitions.

Table 3
Operational Definitions of Problem Behavior and Less-desirable Behavior

1. Problem Behavior	Hitting, pinching, grabbing, slapping, scratching, throwing things toward the teacher within 6 inches, yelling or screaming, and rudeness to access teacher attention, teacher assistance and materials, and following delays to and denials of those events.
2. Less-desirable Behavior	Responses other than the targeted social skills and problem behavior to access teacher attention, teacher assistance and materials, and following delays to and denials of those events.

Table 4
Description of Evocative Situations and Teaching Scripts

Skill 1: Mand for Teacher Attention	
Evocative Situation	Activity-related material is placed on the table
Teaching Tactics	
Following an Incorrect Skill	
1. Instructions	"When you want a teacher's attention, stop what you are doing, look at the teacher, raise your hand above your head, say 'Excuse me/Pardon me/(teacher's name)' to get them to look at you, and wait for the teacher to respond"
2. Modeling	The skill was simultaneously modeled by the teacher
3. Teacher-child Role Plays	Following the instructions and modeling, the teacher said, "Let's practice." The teacher reenacted the evocative situation, followed by the child practicing the mand for attention skill
4. Descriptive Praise and Reinforcer Delivery	"Nice job remembering to wait for the teacher's attention" after teaching resulted in the child engaging in the correct skill
Following a Correct Skill	
5. Descriptive Praise and Reinforcer Delivery	"Nice job stopping, looking, raising your hand, saying, 'Excuse me/Pardon me/(teacher's name),' and waiting for the teacher to respond," and then attention was delivered.

Skill 2: Framed-mands for Materials and Assistance	
Evocative Situation	Activity-related material is placed on the table
Teaching Tactics	
Following an Incorrect Skill	
1. Instructions	"When you want something or assistance from a teacher say, 'May I have the (item)/Will you give me the (item)" or 'May I have your help/Will you help me"
2. Modeling	The skill was simultaneously modeled by the teacher
3. Teacher-child Role Plays	Following the instructions and modeling, the experimenter said, "Let's practice." The experimenter then reenacted attending to the child by saying "Yes, Joy," followed by the child practicing the framed-mand skill
4. Descriptive Praise and Reinforcer Delivery	"Nice job saying 'Will you help me" followed by the teacher providing assistance after teaching resulted in the child engaging in the correct skill
Following a Correct Skill	
5. Descriptive Praise and Reinforcer Delivery	"Nice job saying, 'May I have the (item)," and then the item or assistance was delivered

Skill 3: Delay and Denial Tolerance	Teacher delays or denies the delivery of materials or assistance
Evocative Situation	
Teaching Tactics	"When a teacher says, '(delay or denial cue)' say, 'Okay' and return to playing with your other materials"
Following an Incorrect Skill	The skill was simultaneously modeled by the teacher
1. Instructions	Following the instructions and modeling, the experimenter said, "Let's practice." The experimenter then reenacted the delay or denial cue followed by the child saying, "Okay" and returning to the activity.
2. Modeling	
3. Teacher-child Role Plays	"Nice job saying, 'Okay' and returning to the activity" after teaching resulted in the child engaging in the correct skill
4. Descriptive Praise and Reinforcer Delivery	"Nice job saying, 'Okay' and returning to the activity" and then the item or assistance was provided.
Following a Correct Skill	
5. Descriptive Praise and Reinforcer Delivery	

Table 5.
Social Validity Assessment – Closed-Ended Responses

Likert Scale: 1 (strongly disagree), 2, 3, 4 (no opinion), 5, 6, 7 (strongly agree)

Questions	Assistant Director of Quality Assurance	Director of Preschool	Lead Teacher	Assistant Teacher	Parent (mom)	*Average*
Program Goals						
1. Do you think children improving their communication skills to request a teacher's attention and assistance and to request classroom materials are valuable social skills and would be appreciated at school?	7	7	7	7	7	7
2. Do you think children improving how to tolerate when desired classroom materials are delayed and denied when a teacher is busy is a valuable social skill and would be appreciated at school?	7	7	7	5	7	6.6
After Viewing Pre- and Post-Intervention Videos						
3. Are you satisfied with the way these children requested the teacher's attention and do you think their behavior would be appreciated at school?	Pre 6 Post 7	Pre 5 Post 6	Pre 5 Post 6	Pre 3 Post 7	Pre 3 Post 7	Pre 4.4 Post 6.6
4. Are you satisfied with the way these children requested the activity materials or teacher's assistance and do you think their behavior would be appreciated at school?	6 7	5 6	5 6	5 7	5 7	5.2 6.6

5. Are you satisfied with the way these children behaved when the materials they wanted were delayed or denied and do you think their behavior would be appreciated at school?	5	7	6	6	5	6	5	7	6	7	5.4	6.6
After Viewing Teaching Strategies Video												
6. Do you think these are acceptable teaching strategies for a school setting?	7		5		6		7		7		6.4	
7. Would you recommend these teaching strategies to other teachers and practitioners?	7		6		7		7		7		6.8	

Table 6.
Social Validity Assessment – Open-Ended Responses

Questions	Assistant Director of Quality Assurance	Director of Preschool	Lead Teacher	Assistant Teacher	Parent (mom)
			After Viewing Pre-Intervention Videos		
3. Are you satisfied with the way these children requested the teacher's attention and do you think their behavior would be appreciated at school?	"They asked for materials for the most part instead of grabbing."	"At first I thought the children were not listening and it seemed their behavior was somewhat chaotic. Yet, they repeated the command, "wait please" and so they understood what was being asked of them and for the most part they responded appropriately."	"Their behavior is appreciated at school only because the children are in a learning process. The three children are looking for the teacher's attention because of the materials. The children are eager to play, patience definitely is something that has to be taught."	"I think the children needed more work on getting the teacher's attention and their listening skills."	"Only one child would look at the teacher when she wanted his attention. Another would just speak loudly to be heard and the third child barely said anything."
4. Are you satisfied with the way these children requested the activity materials or teacher's assistance and do you think their behavior would be appreciated at school?	"They appeared to be asking appropriately. They did not take without asking."	"The children did not cry or scream or even demand the materials. They repeated the phase "wait please" and they did wait but not always patiently (some wiggling)."	"Yes, this was a new learning skill for the children and what is impressive is the teachers patience with them. The children are responding in a normal way."	"I am somewhat satisfied with the way the children requested the materials and assistance from the teacher. They need a little more work so that their behavior can be more appreciated."	"One child did a lot of grabbing of materials right away while another would look at the materials and hesitate before grabbing them."

5. Are you satisfied with the way these children behaved when the materials they wanted were delayed or denied and do you think their behavior would be appreciated at school?	"One child began to flip paper around when asked to leave turquoise ink on the table, but in general, all children waited."	"Yes, the children responded appropriately and were not out of control at anytime while waiting to be given the materials."	"Yes, their manners could have been a little better. However, it's still a learning process and over the course of time, I am sure they will get it."	"I'm satisfied with the way the materials were delayed and denied. The children needed to learn how to wait for the materials and learn when they are not able to have what they ask for sometimes. This would be appreciated at school."	"The children were a little impatient when they were denied the materials but did wait."
After Viewing Post-Intervention Videos					
6. Are you satisfied with the way these children requested the teacher's attention and do you think their behavior would be appreciated at school?	"Children raised their hand to gain the teacher's attention, looked teacher in the eye, and made a verbal request. Much better than the first video."	"The two boys raised their hands when they wanted to request the materials. The three children were on task and the behavior was very appropriate."	"Yes, the children were raising their hands to get the teachers attention, also using their words "excuse me" or "pardon me" to ask for another toy or different materials that were placed on the table."	"I am very satisfied on the way the children requested the teacher's attention. This behavior would be very appreciated at school."	"It's helping the children to learn great communication skills"

7. Are you satisfied with the way these children requested the activity materials or teacher's assistance and do you think their behavior would be appreciated at school?	"Same reason as above."	"Some educators frown on preschool children having to raise their hands to make requests, however the behavior of the children seems to support raising their hands to make a request. The children knew the adult would respond and so there was mutual interaction."	"Yes, they raised their hands, waited for the teacher's response, and continued to play. The children seemed to have more patience waiting and asking for the materials."	"I'm very satisfied with how they requested the materials and the teacher's assistance. Their behavior would be very appreciated at school."	"Again, the children are learning to request things through verbal communication instead of physically snatching and taking what they want."
8. Are you satisfied with the way these children behaved when the materials they wanted were delayed or denied and do you think their behavior would be appreciated at school?	"They were able to wait and respond without appearing frustrated."	"Yes, the children waited for the materials after raising their hands and they knew their request would be acknowledged by receiving the material."	"Actually, the children were not pointing or whining, they were actually waiting their turn."	"I was amazed at how the children reacted when they were denied and when the materials were delayed. They children didn't act out or get upset. This behavior would be really appreciate at school."	"I think it teaches the children how to have patience and understanding which would greatly help the teachers at school. It would prevent arguments amongst each other."

After Viewing Teaching Strategies Video

9. Do you think these are acceptable teaching strategies for a school setting?	"Children were given clear directions, an opportunity to practice, and positive reinforcement.	"I do think these are acceptable teaching strategies in the school settings because of the number of children in a classroom. The teacher-child ratio is 1 to 10 so during any period of time children need to learn how to make a request but also allow time for the teacher to meet these requests."	"Yes, it teaches the children to use words, make eye contact, ask the question, and wait for the teacher's response"	"I think these are good strategies for our school setting."	"Again, I feel these teachings show the children great verbal communication skills and how to be patient when they are delayed or denied something."
10. Would you recommend these teaching strategies to other teachers and practitioners?	"Yes, simple enough that all teachers can do, helps children learn self control and appropriate ways to gain attention, assistance, and items. Also, it will make teachers jobs easier (classroom management)"	"I would, however given our background in the development of appropriate practices, the use of children raising their hands to make a request would be a "hard sell" for some staff in the early education field.	"Yes, I would. It would help the children to learn to wait for things and a teachers attention. The skills practiced in the video would go a long way in a classroom setting"	"I would recommend these strategies to other teachers and practitioners. I think this would be good for the teacher and the students."	"The children learn the correct way of getting the teachers attention without having to yell and they also learn to wait and ask for what they want instead of just taking things."

11. Is there anything else you would like to add that might improve these teaching strategies?	"Looked appropriate and effective to me"	"No"	"Teaching these skills to the entire classroom would be a plus. Sometimes the children feel left out if you don't answer them or acknowledge them right away. However, with these tools it encourages the children to raise their hand and ask a question and wait for a response.	"There is nothing to improve. It is good just the way it is."	"I personally think these teaching are great because they can also be applied at home with the children's parents and siblings"

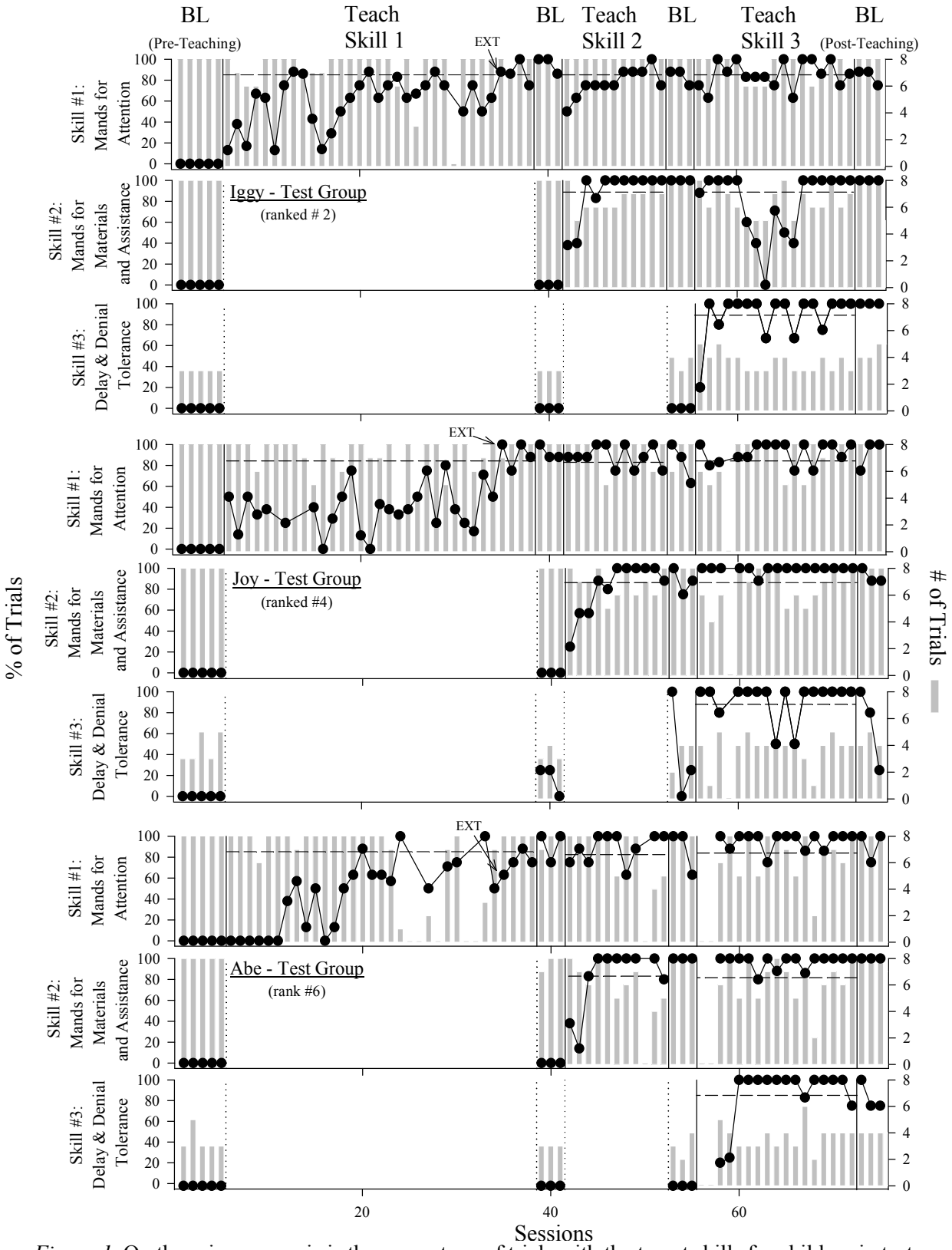

Figure 1. On the primary y-axis is the percentage of trials with the target skills for children in test group in classroom A denoted by the closed circles. On the secondary y-axis is the number of trials per session denoted by the gray bars. The horizontal dashed lines denote the 85% acquisition criteria line.

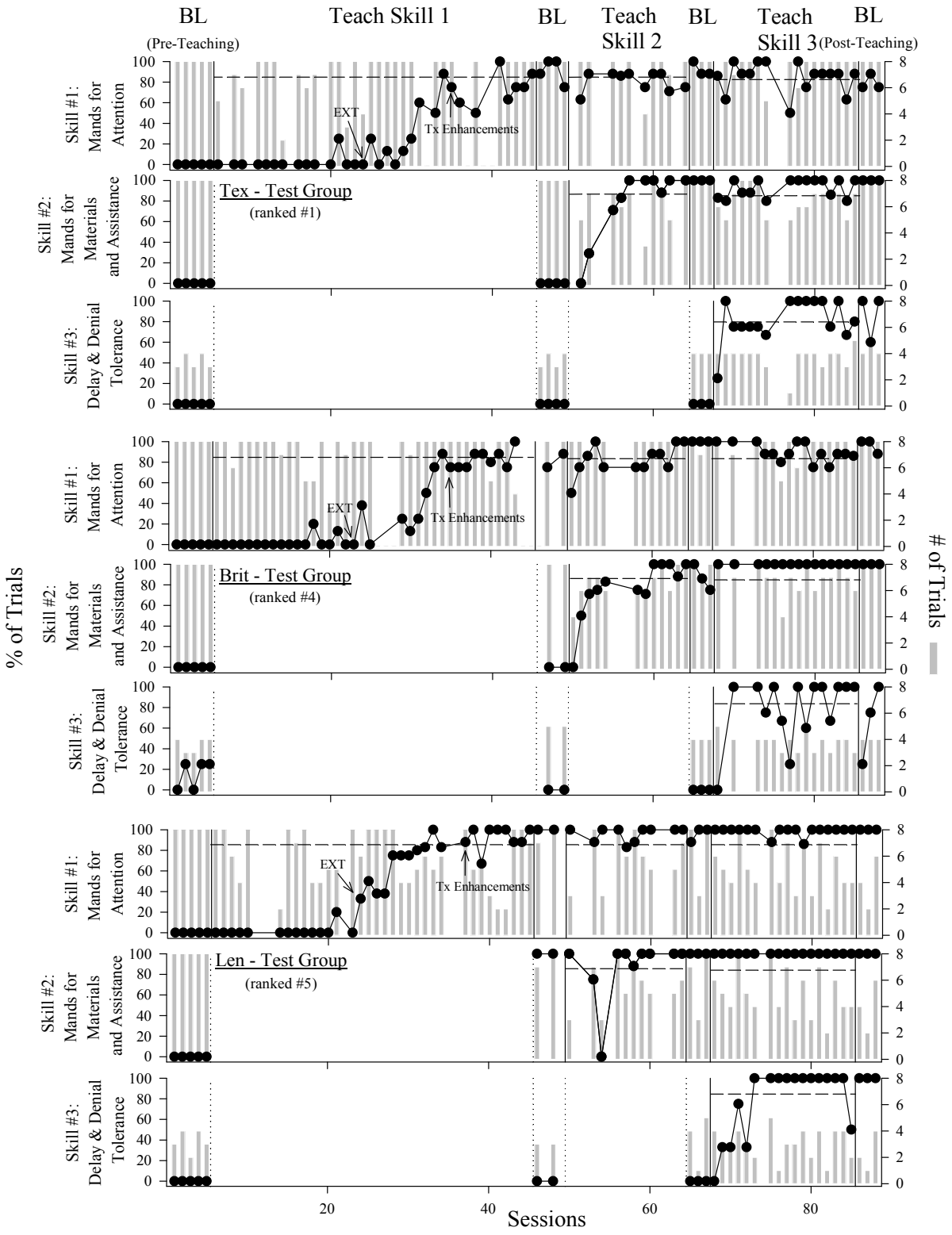

Figure 2. On the primary y-axis is the percentage of trials with the target skills for children in test group in classroom B denoted by the closed circles. On the secondary y-axis is the number of trials per session denoted by the gray bars. The horizontal dashed lines denote the 85% acquisition criteria line.

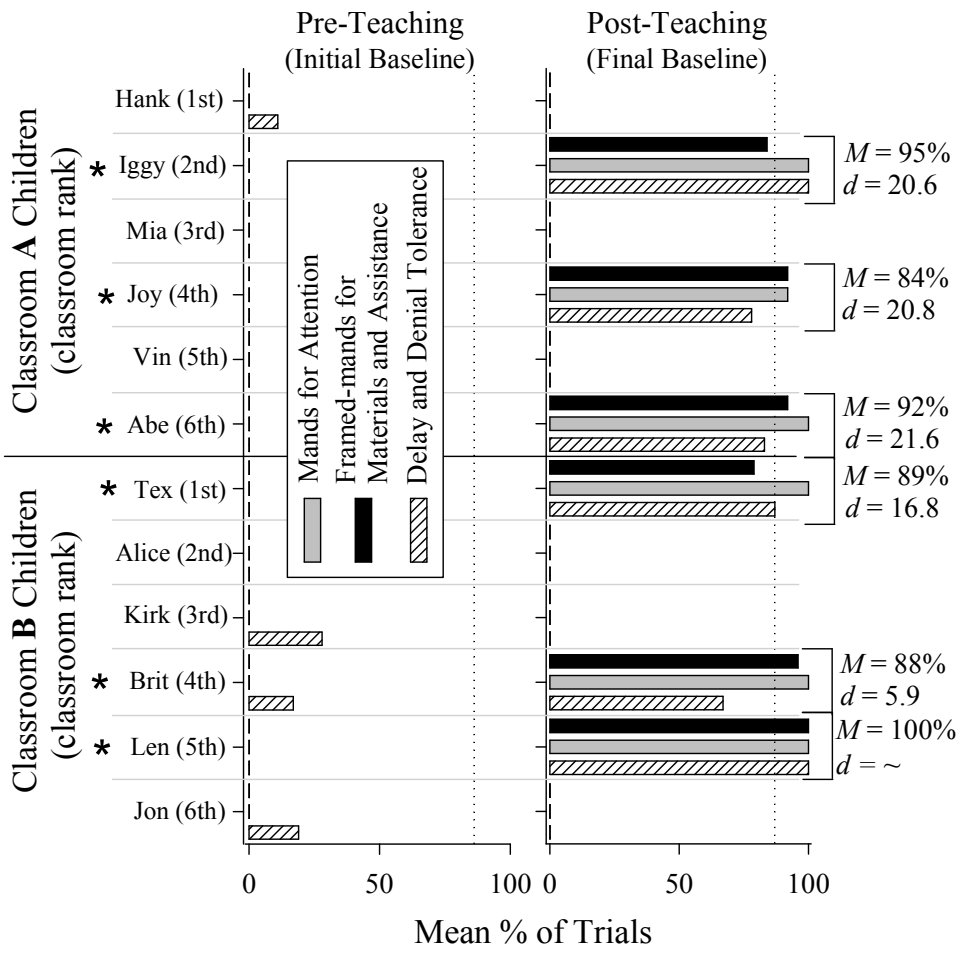

Figure 3. Mean percentage of trials for the last three sessions in which mands for attention (closed bar), framed-mands for materials and assistance (gray bar), and delay and denial tolerance (hatched bar) observed during the pre-teaching and post-teaching baselines in Study 1. The top six children are from classroom A and the bottom 6 children are from classroom B. Children in both classrooms are depicted in ascending rank and asterisks denote the children in the test group. The mean across is all skills for each child along with an effect size (Cohen's *d*) statistic describing the magnitude of difference from pre-teaching to post-teaching. The tilde next to Len's effect size denotes that the statistic cannot be computed.

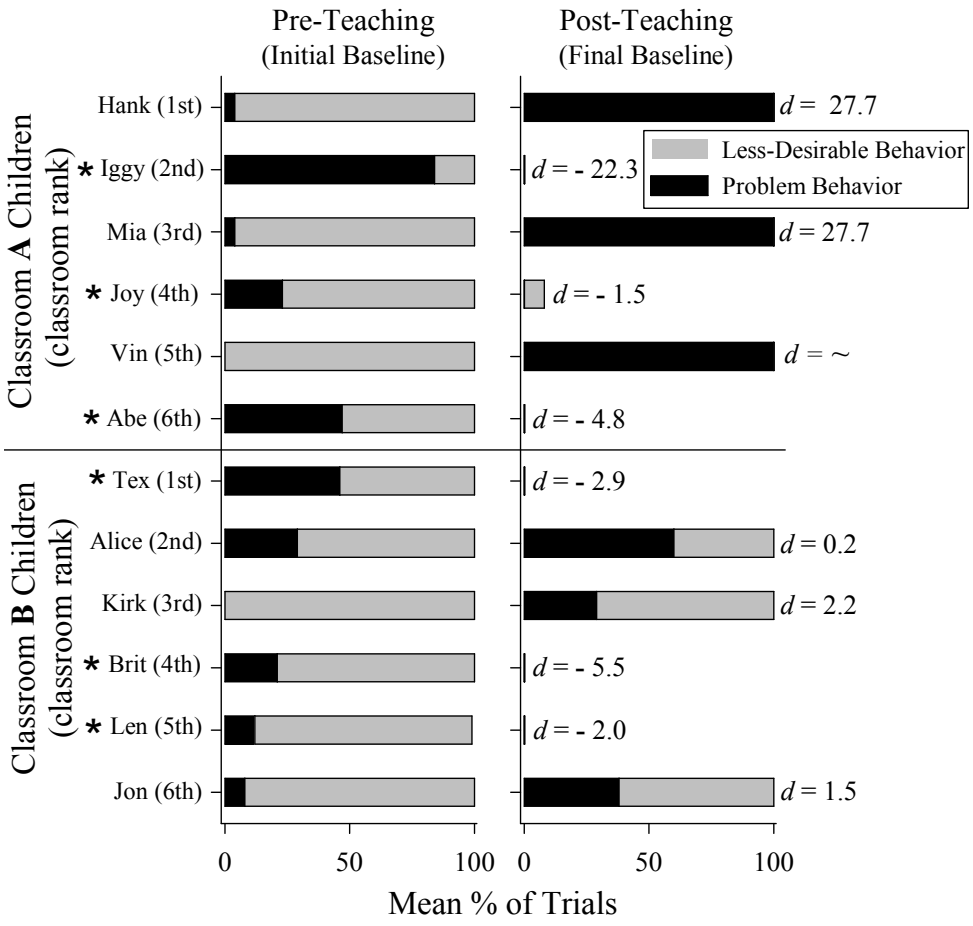

Figure 4. Mean percentage of trials with problem behavior (closed bar) and less-desirable behavior (gray bar) observed during the last 3 sessions of pre-teaching and post-teaching in Study 1. The top six children are from classroom A and the bottom 6 children are from classroom B. Children in both classrooms are depicted in ascending rank and asterisks denote the children in the test group. The tilde next to Vin's effect size denotes that the statistic cannot be computed.

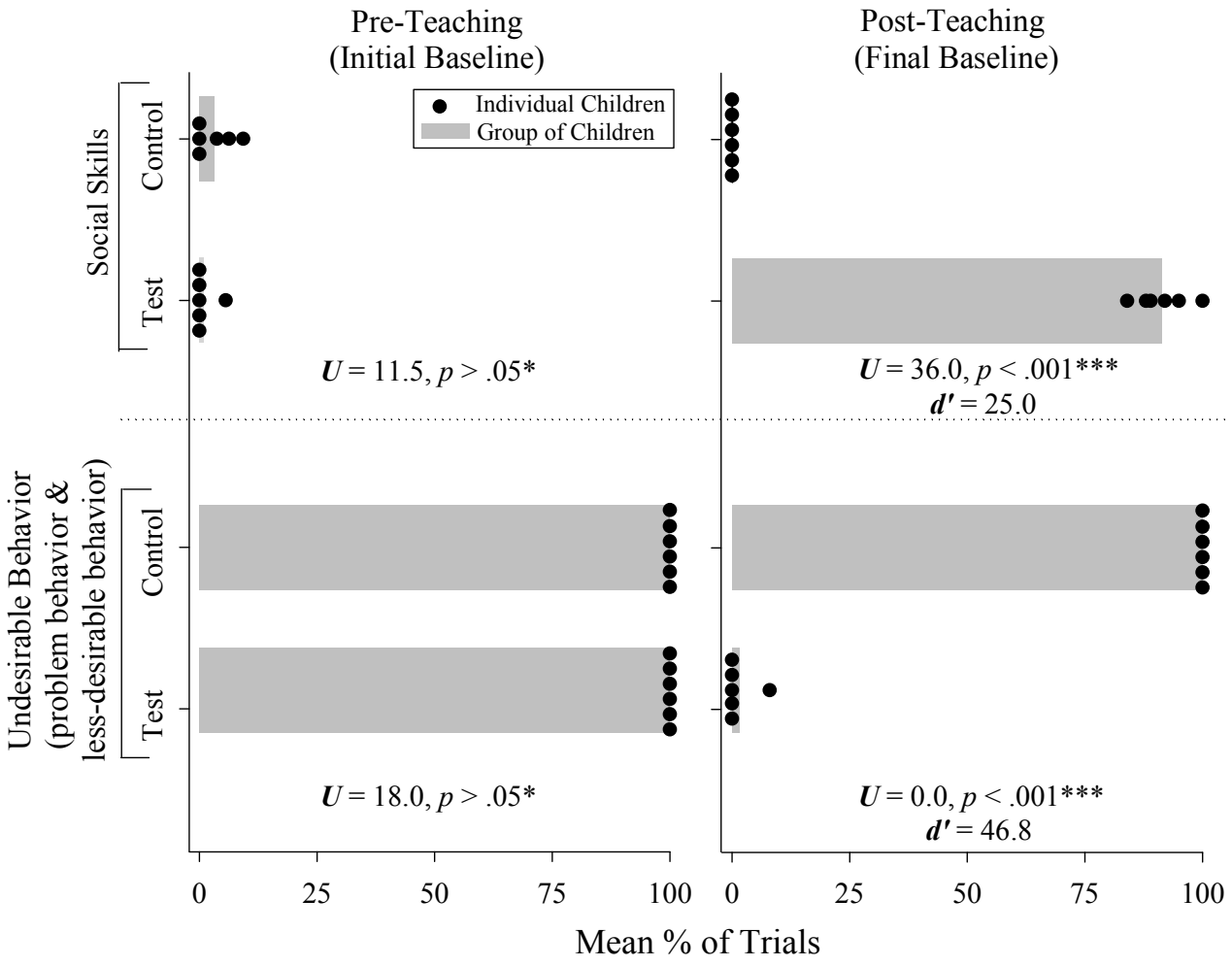

Figure 5. Mean percentage of trials for the last three sessions in which the social skills (top row) and undesirable behavior (second row) were observed during the pre-teaching and post-teaching baselines for each child (closed circles) and groups (gray bars) in Study 1. A two-tailed Mann-Whitney *U* statistic and an effect size statistic using pooled variance (Cohen's *d'*) are reported for between-group comparisons.

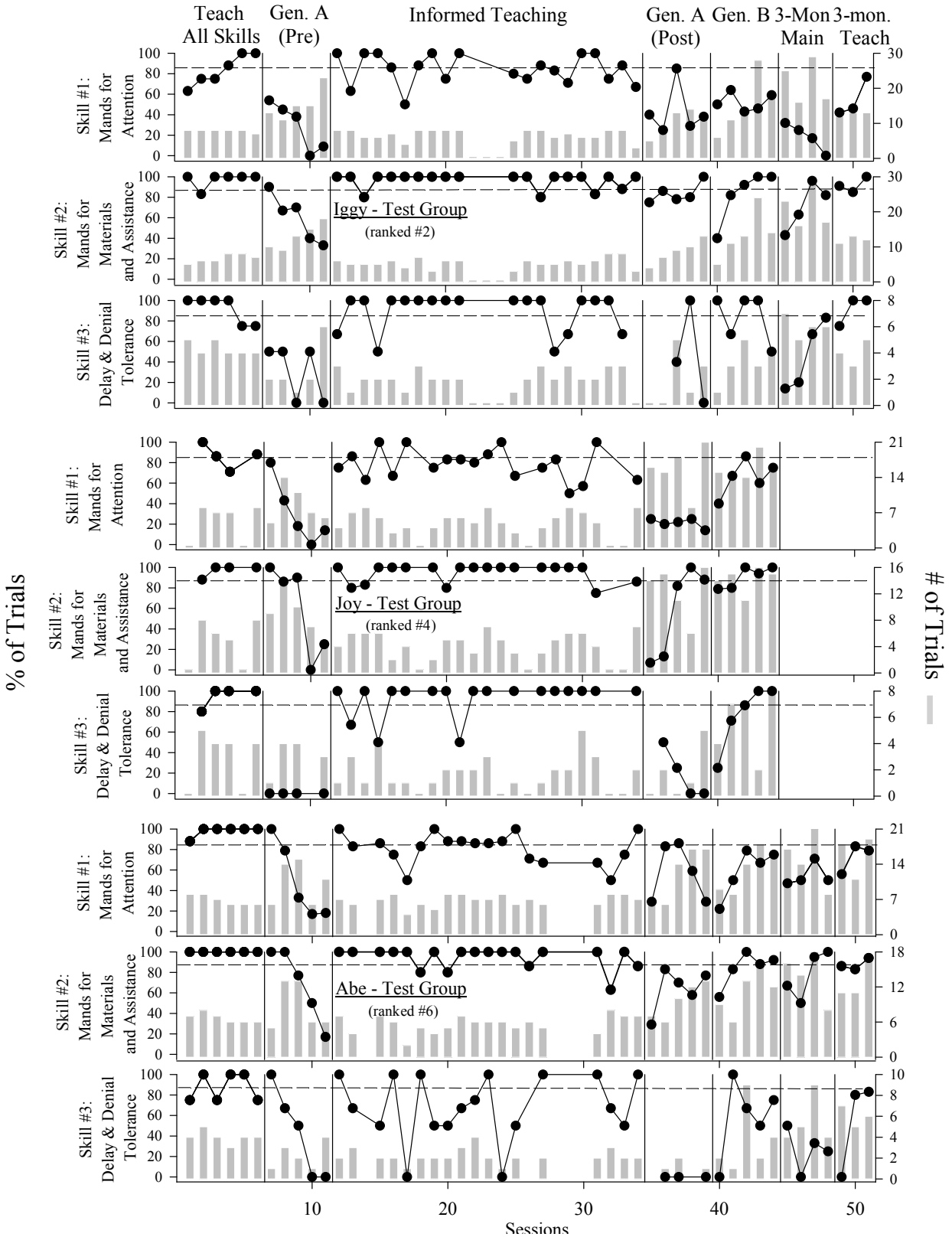

Figure 6. On the primary y-axis is the percentage of trials with the target skills for children in test group in classroom A denoted by the closed circles. On the secondary y-axis is the number of trials per session denoted by the gray bars. The horizontal dashed lines denote the 85% acquisition criteria line.

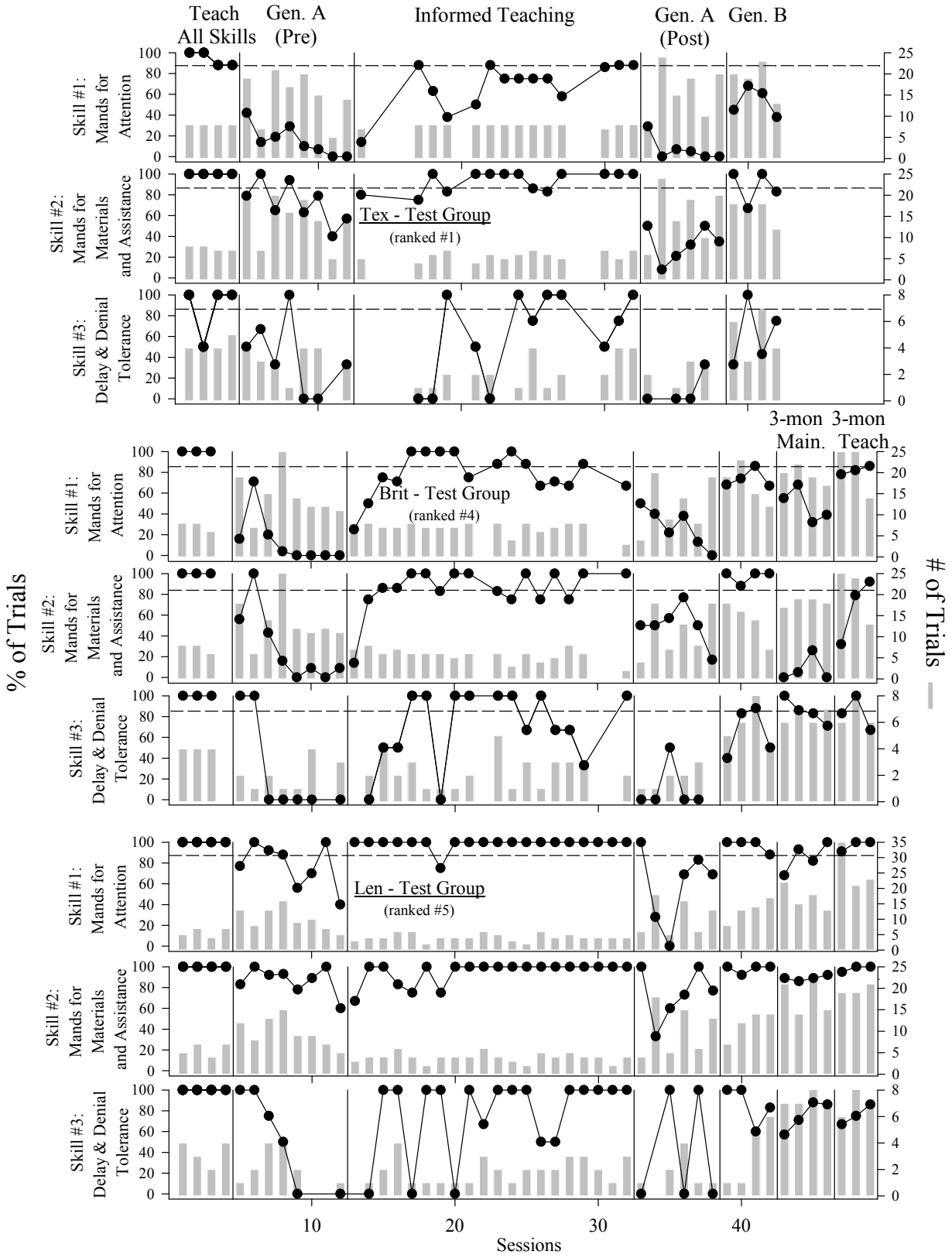

Figure 7. On the primary y-axis is the percentage of trials with the target skills for children in test group in classroom B denoted by the closed circles. On the secondary y-axis is the number of trials per session denoted by the gray bars. The horizontal dashed lines denote the 85% acquisition criteria line.

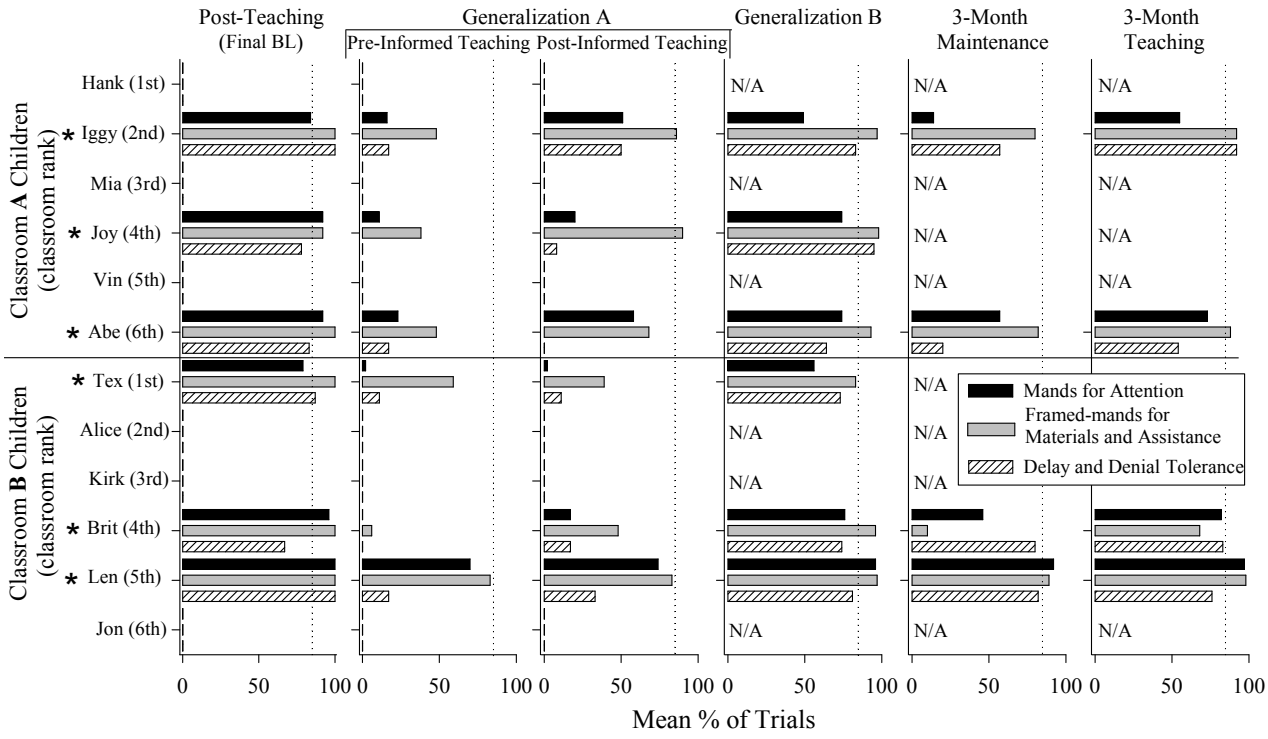

Figure 8. Mean percentage of trials for the last three sessions in which mands for attention (closed bar), framed-mands for materials and assistance (gray bar), and delay and denial tolerance (hatched bar) observed during pre-informed-teaching and post-informed-teaching baselines and 3-month maintenance and teaching evaluations in Study 2. Children's performance during post-teaching of Study 1 is replicated here to serve as a comparison. The top six children are from classroom A and the bottom 6 children are from classroom B. Children in both classrooms are depicted in ascending rank and asterisks denote the children in the test group.

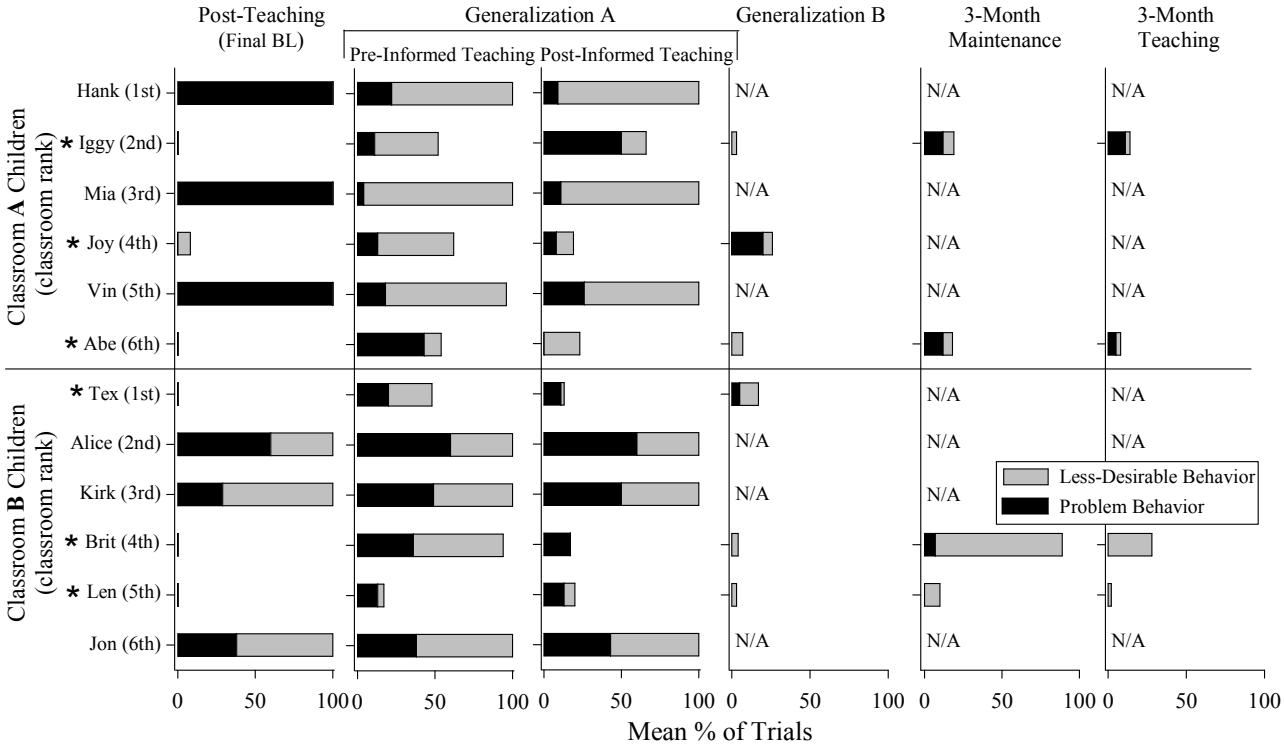

Figure 9. Mean percentage of trials for the last three sessions in which problem behavior (closed bar) and less-desirable behavior (gray bar) observed during pre-informed-teaching and post-informed-teaching baselines and 3-month maintenance and teaching evaluations in Study 2. Children's performance during post-teaching of Study 1 is replicated here to serve as a comparison. The top six children are from classroom A and the bottom 6 children are from classroom B. Children in both classrooms are depicted in ascending rank and asterisks denote the children in the test group.

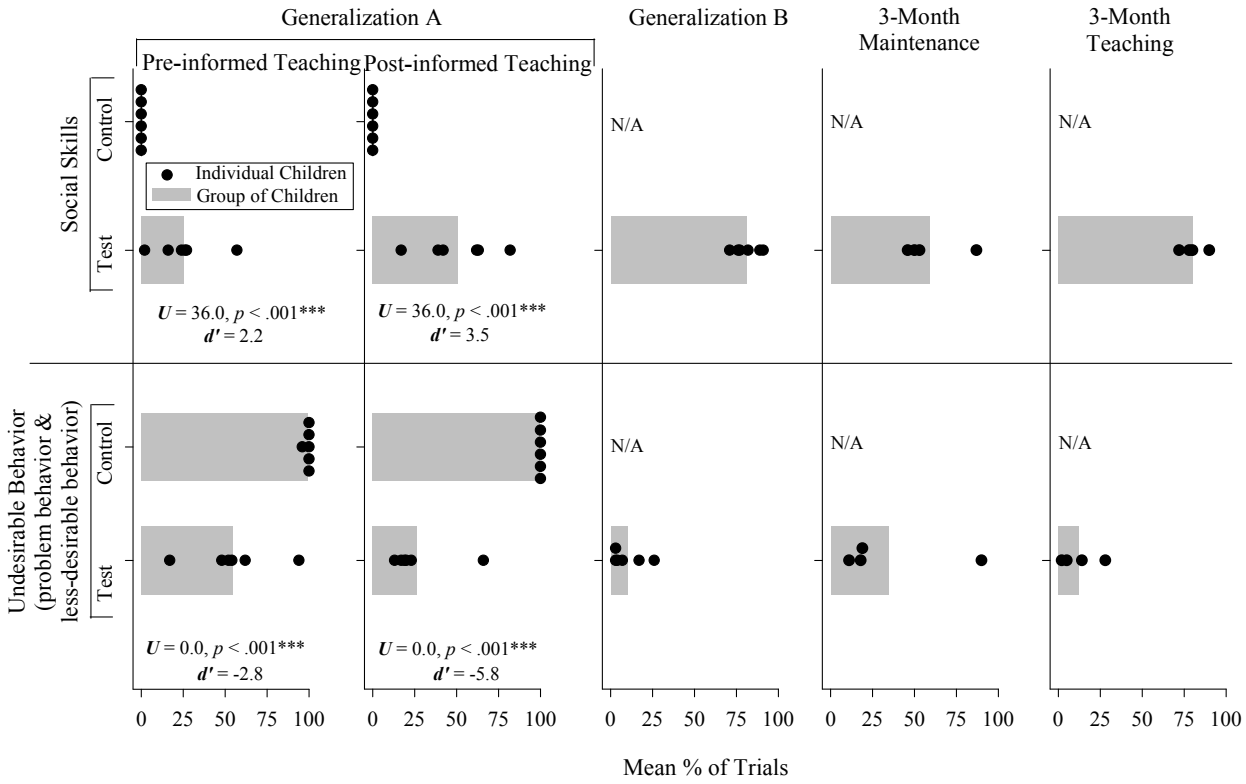

Figure 10. Mean percentage of trials for the last three sessions in which the social skills (top row) and undesirable behavior (second row) were observed during pre-informed-teaching and post-informed-teaching baselines and 3-month maintenance and teaching evaluations for each child (closed circles) and groups (gray bars) in Study 2. A two-tailed Mann-Whitney *U* statistic and an effect size statistic using pooled variance (Cohen's *d'*) is reported for between-group comparisons.

Appendix A

Language and Self-Control Skills Questionnaire

Teacher: _____
Interviewer: _____
Date: _____

1. Please list all of the children who could benefit from (a) learning more appropriate communication skills to obtain a teacher's attention or assistance and asking for items and (b) learning how to effectively tolerate situations in which the events requested are not immediately available or not available at all (up to 12):

Children	Rank
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )
_____	( )

2. By placing numbers next to their names, rank the children listed above according to his/her need for support in this areas. A "1" should be assigned to the child who would benefit the most (has the most difficulty learning these skills), and a 12 should be assigned to the child who would benefit the least (out of the 12 children listed).