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TEACHING SOCIAL SKILLS TO STUDENTS WITH AUTISM: A VIDEO MODELING SOCIAL STORIES APPROACH

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ABSTRACT: The present study evaluates the effects of a social story procedure as developed by Gray (2010). The social story alone was presented in a video modeled format to four middle school students who were eligible for the special education autism criteria and who were instructed primarily in a public middle school general education setting. Using a multiple baseline design across participants in their natural school setting, this study found consistent improvements in all participants' social responses when greeted by peer helpers. During the follow-up phase, participants' prosocial greeting responses remained consistent with intervention phase responses. One of the primary purposes of this study was to find more reliable evidence-based treatments and outcomes for those individuals afflicted with autism, a growing population within our society. Importantly, this study placed particular emphasis on a social story protocol as employed in the absence of other concurrent treatments. Participants were exposed to a video modeling protocol within a natural school setting. Social stories videos were focused on peer-interactive greeting behaviors. Techniques for establishing generalization of prosocial peer-interactive behaviors are discussed, and strategies for observing students during follow-up conditions are described.
KEYWORDS: social stories, autism, social communication skills, video modeling, peer-helpers, natural settings, generalization

Autism spectrum disorder (ASD) is a developmental disorder that affects an individual's communication, social, behavioral, and sensory aspects of functioning (American Psychiatric Association, 2013). According to the United States Centers for Disease Control (CDC), diagnoses of ASD have been on the rise for the past 10 years (U.S. Department of Health and Human

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Services, 2014). Presently, the autism incidence/prevalence as indicated by the CDC is one in 68 children. Enigmatically, in the middle of the last century, autism was viewed as an extremely uncommon condition impacting fewer than four in 10,000 children (MacFarlane & Kanaya, 2009). As forwarded by Singh, Illes, Lazzeroni and Hallmayer (2009), autism has emerged from near anonymity to an exponential source of public concern and financial stress on families and school districts. Autism has become a major source of academic argument and professional discord (e.g., Boutot & Smith Myles, 2010). This condition has become a source of media hyperbole (Belcher & Maich, 2014) and social policy debate regarding race-based access to diagnosis and treatment (see Fountain & Bearman, 2011, for a discussion). Never in the history of childhood physical or behavioral problems has our culture witnessed such a proliferation of parent organizations seeking to initiate legislation to subsidize expanded and improved treatment programs.

Recent epidemiological/policy management studies have documented the previously unrecognized but continually escalating cost of treatment for children with autism. Compared to normal functioning children in the United States, each child afflicted with autism requires an additional $17,000 per year for autism services (Lavelle, Weinstein, Newhouse, Munir, Kuhlthau, & Prosser, 2014). Nationally, this translates to an additional $11.5 billion spent on various forms of autism services during 2011 alone. Looking at the quickly escalating financial burden on school districts and tax-payers, the emotional and financial load on parents, and the time-intensive interventions that must be employed within the home environments in conjunction with the schools, it is easy to ask how and where we will find the resources needed to adequately address this escalating crisis. As described by Lavelle et al. (2014), it is not enough to locate and allocate the additional resources to meet the immediate needs of this unanticipated and growing population. In order to be "cost-effective," treatments must have sustainable and pervasive effects. In behavioral terms, evidence-based outcomes must demonstrate behavior improvements that generalize across natural settings, time, and diversified conditions.

Social Communication and Peer Interaction

Within the population identified as autistic, those whose intellectual functioning is average to above average comprise the majority (Centers for Disease Control and Prevention, 2014). Social communication conventions, such as socially appropriate conversation, reciprocal interaction, and accurate use and interpretation of nonverbal communication, may be extremely difficult for students who function at even the higher end of the autism spectrum (Woods, Mahdavi, & Ryan, 2013).

As children develop, physical, play-based socialization transforms into verbal communication and interaction (Schlinger, 2009). For children with autism, making this transition in social development and learning new ways of social interaction may be particularly challenging. Indeed, teens with autism may demonstrate a social awkwardness that can be isolating or contribute to symptoms of depression (Woods et al., 2013; Barnhill, 2001). Although social learning theory suggests it is possible to learn behaviors or make cognitive adjustments by observing others alone, by receiving direct instruction, or by modeling or imitation, most studies suggest children with autism may require more direct or structured prompts over a period of time to respond to treatment (Koegel & Frea, 1993; Taylor & Hoch, 2008; Sarokoff, Taylor & Poulson, 2001).

In contrast, one increasingly popular intervention teachers have used in recent years is the social story approach. Developed originally by Gray (1994), this type of intervention "describes a situation, skill, or concept in terms of relevant social cues, perspectives, and common responses in

a specifically defined style and format" (Gray, 2010, p. xxv). The stories provide descriptive details and illustrations pertaining to a wide range of challenging social circumstances and are created (or selected) for individuals based on deficiencies in their social repertoires. Social stories can be read or viewed by the individuals for whom they are designed (Gray, 2000).

Treatments within Natural Environments

Ecobehavioral approaches are notable for focusing on behavioral strategies that easily merge into (and are sustained by) natural environments. These procedures have a special emphasis on blending unobtrusive treatments with contexts that are able to support them. For example, an ecobehavioral study is described by Campbell and Lutzker (1993) in which a child with autism had a history of property destruction and tantrum behaviors. No form of direct intervention was employed with regard to the child's maladaptive behaviors. As a strategy for indirectly bringing about behavioral change that would have an increased likelihood of being sustained within the child's natural environment, intervention was directed at teaching the child basic sign language skills as a means of communication. Concurrent with the acquisition of sign language skills, the child's maladaptive behavior diminished. As pointed out by Lutzker, Steed, and Huynen (1998), the special contributions of ecologically fashioned interventions have been insufficiently explored. From our perspective, social stories may be adapted and extended such that the protocol for implementing them employs many of the components of an ecobehavioral model.

Evidenced-Based Treatments

Although many of the controlling variables remain unclear in the area of social stories intervention (ASAT, 2005), a growing body of research suggests that social stories appear to contribute to treatment packages aimed at teaching social/communication skills to children with developmental disorders (Thiemann & Goldstein, 2001; Sansosti & Powell-Smith, 2008). The National Autism Center (NAC) reviewed existing research in peer-reviewed journal articles and evaluated social story efficacy based on standards for "Evidence-Based Research." NAC's intervention outcomes were organized in four categories: 1. established treatments, 2. emerging treatments, 3. unestablished treatments, and 4. ineffective/harmful treatments. The evaluation by NAC indicated that social stories are considered an established treatment with promising results for children of ages six through 14 with ASD or Asperger's syndrome (National Autism Center, 2009). The Association for Science in Autism Treatment's (ASAT, 2005) investigation of social story efficacy questioned the evidence base of social stories but determined that they appear to be effective under some conditions. ASAT recommended that future researchers use controlled experimental designs to more precisely evaluate the variables influencing behavior change (ASAT, 2005). Such paradoxical findings leave professionals interested in their use and indicate a need for more definitive results. Although the empirical efficacy of social stories remains incomplete, identifying an intervention that has a more robust evidence base is critically important to a growing number of families, educators, and individuals with autism within our culture.

Current investigations in the area of social stories have targeted a variety of teaching strategies, using children of different ages with various levels of ASD in a variety of settings. For example, Hanley-Hochdorfer, Bray, Kehle, and Elinoff (2010) sought to improve the verbal initiations and responses to peers of four participants with autism, ranging in age from six to 11, using social stories within the school setting. Of the four participants, two indicated little to no improvement during intervention and follow-up, and the remaining two participants showed

slightly better results (Hanley-Hochdorfer et al., 2010). Delano and Snell (2006) paired participants diagnosed with autism with same-aged nondisabled peers to investigate the effects of social stories on social skills. During intervention, social stories were created for and read to participants. Each story was unique to each participant as it described the day's play activity and expected targeted social skills. Once participants listened to their social stories, they answered comprehension questions, which were subsequently followed by play sessions with nondisabled peers. Though improved social interaction was observed in all three participants with a novel peer in the intervention setting, generalization of this skill in the classroom was established for only two of the three participants.

Litras, Moore and Anderson (2010) employed social stories in a video self-modeling format to teach social skills to a three-year-old male diagnosed with autism. Using a multiple baseline design across behaviors, these researchers measured this participant's greetings, invitations to play, and responses to his parents. This particular treatment is somewhat distinctive in that it included a narration of dialogue using two puppets and a self-modeled video of the participant acting out the behaviors provided within the social story. The examples provided expectations of the target behaviors, such as greeting and responding to a greeting, as well as the participant interacting with his parents. Results indicated improved greetings, making invitations to play, and contingent responding to parents following intervention; however, the findings were narrow in that the acquisition of social skills was measured with parents and to the exclusion of the child's peers.

Using an ABAB design, Bledsoe et al. (2003) focused on the eating skills of an average functioning adolescent male diagnosed with Asperger's syndrome. A social story was created unique to the participant's needs to specifically improve the eating-related behaviors of spilling and wiping during meals. The social story was read to this participant just prior to lunchtime for five days and was also available to him upon request. Consistent with the experimental design, the student demonstrated a clear decrease in spilling behavior and an increase in wiping behavior only during the intervention phases. Although the target behaviors were improved, demonstration of external generalization in this study was not realized. Indeed, demonstrating the generalized effects of social stories has been a continuing source of difficulty involving a large number of investigations. Thiemann and Goldstein (2001) incorporated a multiple baseline design across five children with autism spectrum disorder. The treatment package included social stories, pictorial and written cues, and supplemental video feedback. The protocol was conducted twice per week and included a 10 min instruction session that utilized visual stimuli with pictures and text detailing a social interaction. Instruction sessions were followed by 10 min of social interaction practice and concluded with 10 min of self-evaluation with participants' video feedback. During social interaction practice, participants received adult prompts depicting targeted skills that did not include those of their matched typically developing peers. Although treatment effects were demonstrated for four different social behaviors, findings revealed that skills were not maintained when visual cues and adult prompts were terminated. Here again, we find that this intervention appeared to be effective only during the time in which training was being conducted.

A broad spectrum intervention package developed by Sansosti and Powell-Smith (2008) was implemented with three students diagnosed with high-functioning autism/Asperger's syndrome. Prior to intervention, participants were observed during recess where problem behaviors were identified for each child. Subsequently, a unique social story was written to address each student's target behaviors. The social story was presented in a *PowerPoint* slideshow format with a voiceover that made the social story audible to each participant. This slide show was immediately followed by a short video of a peer who modeled the same target behaviors. Consistent with several

of Bandura's social learning investigations (e.g., Bandura, Ross, & Ross, 1961) and numerous related behavior analytic studies (e.g., Alvero & Austin, 2004; Rehfeldt, Latimore & Stromer, 2003), participants observed their peers and tended to model particular types of prosocial behaviors. One of the participants demonstrated improved responding to the treatment package independent of any additional modifications to the study's intervention. Most importantly, he continued to exhibit high levels of social communication skills during the follow-up condition. However, two of the three participants failed to demonstrate consistently improved social communication skills in the absence of formal treatment.

In yet another attempt to address this issue, Sansosti and Powell-Smith (2008) incorporated generalization probes during the baseline and intervention phases and utilized a fading technique during the follow-up observations of target behaviors. Apparently, generalization was not established as prosocial responses were demonstrated only under conditions in which teacher prompting of confederates was employed. In virtually all of the previously discussed investigations, a continually unresolved aspect of social story efficacy is the extent to which learned prosocial skills transfer across people, settings, and/or other behaviors.

Given the increasing prevalence of autism, now occurring in one in 68 children under the age of eight, an empirical demonstration of the generalizability of outcomes becomes critically important for authenticating the increasingly popular intervention of social stories. The purpose of the current study is to extend the limited research of social story effectiveness in improving generalized prosocial behavior when employing social stories independently within a video modeling protocol. The study was conducted with the ambition of enhancing and extending the skills of children who have social communication deficits. Additionally, we aimed to answer the continuing question regarding the validity of social stories as an intervention for children with autism, which is a concern for many educators and service providers. Clearly, additional research is needed to answer important questions regarding the robust and sustainable outcomes of this approach as an independently functional, evidence-based strategy for training social skills to children with autism spectrum disorder (Hanley-Hochdorfer, Bray, Kehle, & Elinoff, 2010).

During intervention, we focused on improving the peer greeting responses of four participants. It is important to note that as in Campbell and Lutzker's (1993) study, problem behaviors were not directly treated; rather, intervention was conducted by way of a video modeling approach in which no direct-acting contingencies were in effect during any part of the intervention. As part of our treatment plan, we placed particular emphasis on evaluating the extent to which participant improvements might transfer across time, other campus settings, and conditions.

Method

Participants

Participants included four adolescent middle school students, three male and one female, all of whom met Texas Education Agency special education criteria for autism. They received most of their academic instruction in a general education setting with the implementation of inclusive assistance, instructional accommodations, and individual education plan (IEP) goals/objectives. Participants were described by their teachers as needing more social interaction with peers. Informal teacher comments were verified by way of a brief questionnaire (see Appendix A).

Upon receiving approval from a university institutional review board to conduct this study, all parents of participants provided written informed consent for their children's participation. Peer helpers verbally assented to their participation and to remain confidential; their parent and/or

guardians signed written informed consent forms. Peer helpers were reminded that their participation was voluntary and that they had the authority to discontinue their participation at any time. During the initiation of the baseline condition, teachers described the video modeling program to participants individually. Participants were informed that they would have opportunities to view the video once a day at the beginning of the class period. Teachers were instructed that participants were to watch the videos voluntarily.

The four participants in this study included four middle school students: Andrew, Jake, Karen, and Cam. Andrew, a thirteen-year-old African-American male with below-average global cognitive functioning, was in the sixth grade at the time of this study. Jake, a seventh grade student, was a thirteen-year-old Caucasian male with global cognitive functioning in the average range. Karen, a twelve-year-old Caucasian female with below average global cognitive functioning, was in the sixth grade. Cam, an eighth grade student, was a fourteen-year-old Caucasian male with global cognitive functioning in the below-average range. Andrew, Jake, and Cam received special education services outside the general education setting for less than 16% of the instructional day. Karen received special education services outside the general education setting for less than 25% of the instructional day.

Settings

The study was conducted on the campus of a public middle school located in rural East Texas. The middle school had a student body of approximately 950 students, and included grades six through eight. The natural setting in which greetings from peer helpers occurred consisted of traditional classrooms equipped with student desks, a teacher desk, and a white board at the front of the room. During intervention, the classrooms had approximately 26 students and one teacher in the vicinity.

Opportunities for participants to engage in the acquisition of social skills in generalization settings were provided during their lunch and passing periods. The lunchroom, located on the school campus, was arranged as a typical cafeteria-style restaurant, equipped with long picnic-style tables. There were approximately eighty students in the lunchroom during the participants' lunch periods. During passing periods, participants transitioned independently from their classrooms to the lunchroom location or to other classes. Transitions between classes occurred either indoors, outdoors, or in a combination of the two settings, depending on the students' schedules and their respective classroom locations.

Dependent Variable

The target behavior was operationally defined as the frequency of a participant's appropriate greeting responses when being greeted by a peer helper (see Table 1). An appropriate greeting response entailed verbally or nonverbally greeting the peer helper who greeted him/her, in conjunction with a facial orientation in the direction of the peer helper. As described in Table 1, targeted facial orientation included making eye contact, looking at the peer helper, or exhibiting a combination of both. Targeted greeting responses by a participant included making comments, such as "Hello," "Hi," "Hey," "What's up," "Good morning," or "Good afternoon," and exhibiting gestures, such as a wave, fist-bump, high-five, thumbs-up, or a head nod. Greetings that were exhibited in the form of a verbal response but occurred while the participant was looking toward the ground (or away from the peer helper) were not recorded as acceptable target responses (see Table 1 for related details).

Table 1. *Brief Operational Definitions*

Term	**Operational Definitions**
Prosocial Behavior	Responding to peers combines an affirmative or positive verbal and/or nonverbal response while looking toward or at the individual.
Target Behavior (Dependent Variable)	A greeting response is a verbal or nonverbal acknowledgement, coupled with physical orientation, both of which are directed toward the peer helper immediately following his or her greeting.
Non-Social Responding	Responding to peers in a manner that does not combine visual approximation of the peer coupled with an affirmative or positive verbal and/or nonverbal response.
Classroom Probe	A classroom probe occurs when a peer helper approaches and greets a participant in the designated classroom.
Intervention Criteria	Intervention is considered complete when a participant demonstrated the target behavior (correct greeting responses) in four out of a possible four probes in the classroom across three consecutive days.
Generalization Probe	A generalization trial occurs when a peer helper approaches and greets a participant in the following settings outside the classroom: passing period and lunchroom.

Peer helpers. Similarly matched nondisabled peer helpers facilitated treatment in this study. These students attended the same school, were in the same grade level as each participant, and followed general education schedules and lunch breaks consistent with those of the actual participants. Criteria for peer helpers included being appropriate role models for their peer groups and exhibiting strong social skills as determined by a brief questionnaire, which affirmed various prosocial habits of potential peer helpers (see Appendix B).

Teachers. Participating teachers conducted intervention and data collection throughout the study. Teachers in this program were those who taught classes wherein identified participants and peer helpers were mutually enrolled. The teachers had teaching experience ranging from one to 16

years. All teachers received direct observation training in accordance with the procedures and definitions described within Appendix C.

Data Collection

Student greeting responses were recorded by way of event-recording (Ninness, Glenn & Ellis, 1993). These responses were recorded as having met the criteria for a greeting in its entirety (making a verbal and/or nonverbal response and looking at the peer helper) or as an unacceptable greeting (see Appendix D). When participants' greeting behaviors were probed, trials occurred during the baseline, intervention, probe-only, and follow-up phases. Greeting responses by participants occurred twice in each of two general education classes.

Probe observations were conducted daily in the classroom as participants began the intervention phase until correct greeting responses were achieved in four of four opportunities across three consecutive days (Table 1). In accordance with the multiple-baseline across participants design, some participants remained in the baseline condition while others initiated treatment. Data were recorded in the classroom by teachers and staff who focused on the participants' greeting responses to peer helpers.

Once the targeted greeting response criteria were met, participants began the probe-only phase during which probe observations in the classroom were conducted approximately one time per week. On Day 46, all participants entered the follow-up condition. Probe observations within the classroom setting were conducted once per week during the follow-up condition. Generalization probes were conducted once per week in the lunchroom and passing period settings during all experimental conditions (Table 1).

Observation and data recording training. Data collection training included an explanation of verbal and nonverbal target behaviors and role-played exemplars led by the first author of this study. Participating teachers and staff role-played various scenarios that might occur during the course of the experiment. Training with participating teachers and staff was considered completed when recordings from the role-play were 100% accurate on all role-play demonstrations.

Observations. The Observation Recording Form was employed by trained observers during all participants' classroom, lunchroom, and passing period observations in baseline, intervention, probe-only, and follow-up conditions. Three school psychology doctoral interns (including the first author of this study), a campus-based special education facilitator, and three campus-based teachers collected data during the generalization probe observations in order to conduct inter-observer agreement (IOA) observations. Greeting responses by participants were scheduled to occur two times in each of two general education classes in the presence of their participating teachers across baseline, intervention, and follow-up phases. Participants were scheduled to view a benign video daily during baseline and a social story video daily during intervention. Probes for generalization occurred approximately one time per week in both the lunchroom and passing period settings during baseline, intervention, probe-only, and follow-up phases. Peer helper participants approached targeted participants and greeted them in these classroom and generalization settings.

Data were recorded by participating teachers and staff based upon the participants' greeting responses to the peer helpers. To ensure that participants viewed both benign, or social story videos during baseline and intervention, their participating teachers recorded confirmation as "Yes," or non-confirmation as "No," on the Video Verification Form (see Appendix E).

Interobserver agreement

IOA was calculated by dividing the number of rater agreements by the number of rater agreements plus rater disagreements, and then multiplying the result by 100 (Morgan & Morgan, 2009). An agreement was operationally defined as accurate when observed target behaviors were recorded by both observers as having occurred or not occurred.

Disagreement was operationally defined as a circumstance in which one observer recorded that a target behavior occurred, but the second observer did not record the occurrence of the target behavior. Reliability was established by conducting simultaneous observations throughout the study during baseline, intervention, probe-only, and maintenance phases using a secondary observer for 95 (23.9%) of the 397 total observations. Data collected from the observations of both the primary and secondary observers were compared. Of the 95 total IOA observations, 91 resulted in rater agreements, which is approximately 96% IOA agreement for all observations conducted within the study.

Throughout the duration of this study, 11 total fidelity check observations were conducted. Fidelity was conducted by way of random observations that verified participants viewed either a benign video during baseline or a social story video during intervention. Fidelity checks were conducted by either the first author, doctoral interns, or a campus-based special education facilitator, who discretely observed whether or not participants watched their videos during both baseline and intervention phases.

Materials and Implementation of Treatment

The social story used in this study, "How to Greet Someone," was developed by Carol Gray (2010) and published in *The New Social Story Book: 10th Anniversary Edition* (Table 2). The social story was presented in video-model format. During the intervention phase, participants viewed the video-modeled social story on a daily basis via a voice-over on a computer or via an iPad with headphones. The social story described the social scenario during which the desired target behavior was demonstrated in the audiovisual presentation (Table 2).

Table 2. *Social Story*

Social Story Title: How to Greet Someone
There are many ways to greet someone. When I see someone I know, especially if I am seeing that person for the first time that day, it's friendly to say "Hello." They may say "Hello" back to me. They may stop and talk with me. Sometimes people shake hands when they say "Hello." People may try to shake hands with me if they are meeting me for the first time. This will happen more and more as I get older. Once in a while, when I go to visit relatives or close friends, a short hug as I arrive means "Hello." Sometimes, if I am just passing someone I know, I may smile, wave, or just nod my head. If I said hello to that person earlier in the day, smiling, waving, or nodding my head means, *Hello again*. This is a friendly thing to do.

Pre-training the peer helpers. Prior to initiating the treatment protocol, a large group peer helper training session was conducted. During this session, the lead researcher trained peer helpers regarding the proper verbal intonation and gestural topography to be used when making spontaneous social greetings to participants. Peer helpers were each visually or verbally prompted to greet participants by walking up to participants, visually acknowledging by facial orientation toward the participants, and verbally greeting them. They were prompted by a participating teacher, lead researcher of this study, or a doctoral intern to greet participants.

Baseline and pre-treatment instructions. Initiating the baseline condition, teachers described the video modeling program to participants individually. Participants were informed that they would have opportunities to view the video once a day at the beginning of the class period. This process entailed verbally describing and physically demonstrating the response requirements for accessing the iPad or computer video equipment within the students' respective classrooms.

The video employed during the baseline condition was benign in the sense that the video content simply depicted animals such as monkeys in their natural habitat at play or leisure. No programmed reinforcement contingencies were in effect during any part of the multiple baseline conditions. The criterion for baseline stabilization was set at no more than one correct response during the four observations conducted each day. A staggered baseline across participants design was utilized, and the first participant entered the intervention phase upon stabilization in baseline. Subsequent participants entered the intervention when a previous participant had demonstrated four of four correct greeting responses.

Intervention was planned such that students did not enter treatment until a previous participant had demonstrated some level of improvement as a function of the intervention. Participants initiated treatment in a series of consecutively staggered baseline conditions. When the first participant increased his/her target behavior and reached stabilization, as evidenced across three consecutive days without showing variability in his/her improved level of prosocial behavior (four of four correct greeting responses), the second participant was exposed to the social story intervention (see Table 1). The same entry criteria for the intervention phase were in place for subsequent participants. However, because of issues relating to Jake's attendance, Karen, the third participant in this study, entered the intervention phase before Jake had met the target criteria of four of four correct greeting responses in the classroom for three consecutive days.

Procedures

Introducing treatment, classroom teachers provided additional instructions to students regarding how participants might access and view a video of the social story entitled "How to Greet Someone" within their respective classrooms. The content was informative in that similarly matched peers physically demonstrated how to accurately respond to a greeting (see similar strategies conducted by Alvero & Austin, 2004; Rehfeldt, Latimore & Stromer, 2003). Additionally, a voice-over described the necessary verbal/nonverbal actions and the associated purpose of a spontaneous greeting to a peer. The voice-over provided similar details concerning a reciprocated greeting response. The target prosocial behavior was operationally defined as a verbal or nonverbal acknowledgement, coupled with physical orientation, both of which were directed toward the peer helper immediately following his or her greeting. During the first phase of the treatment condition, acceptable target behavior criterion was set at a 50% increase over the stabilized baseline data.

Follow-Up Procedures

On the 46th day of this study, all participants entered the follow-up condition. During this two-week follow-up period, the participants were not exposed to either the benign video or the social story. During this condition, two probe observations were conducted in the classroom context for each participant. At least one observation in each of the lunchroom and passing period settings was conducted.

Results

Using a multiple-baseline across participants design, this study found substantial improvements among participants when exposed to a series of video modeled social stories. Peer helpers greeted participants on four occasions in two classes attended mutually by both participants and peer helpers, and participants began reciprocating these greetings.

During baseline observations, participants responded to greetings infrequently within the classroom context. As shown in the top left panel of Figure 1, Andrew demonstrated virtually no correct prosocial greeting responses when greeted by peer helpers as shown by his classroom data points. Andrew entered intervention on Day 7 as he began daily watching the social story video "How to Greet Someone" and demonstrated gradually accelerating levels of social responsiveness when greeted by his peers. Beginning on Day 3 of treatment, he emitted one correct response in the classroom on two consecutive days. As shown in the top center panel of Figure 1, Andrew sustained a series of near perfect responses when approached by peer helpers within the classroom context during the intervention phase. Upon meeting the criteria of four correct greeting responses out of a possible four opportunities per day across three consecutive days in the classroom, Andrew transitioned into the probe-only phase of the treatment condition. With the exception of only a few days, he sustained a series of correct peer greetings when approached by one of the peer helpers within the classroom context. Beginning on the Day 47, Andrew moved into the follow-up condition, where he continued to demonstrate prosocial greetings at a higher level than observed during baseline observations. Specifically, he emitted two of four correct prosocial responses during each of his follow-up observation days.

During classroom observations in baseline, Jake maintained an almost complete series of nonsocial reactions to greetings from peer helpers. Upon entering the intervention phase, Jake began watching the social story video and demonstrated a brief increase in appropriate prosocial responding as indicated by his classroom data points (two of four prosocial responses on the first day of treatment). Thereafter, he had two days of correct prosocial responding on one of the four occasions during which he was approached by peer helpers. On Day 4 of treatment, Jake remained unresponsive when greeted by peers, followed by several days during which his level of social responsiveness increased (see center of panel within Figure 1). By the Day 35 of treatment, Jake's level of correct responding to peer approaches improved to 4 out of 4 correct greeting responses across three consecutive days as indicated by the classroom data points. On meeting target behavior criteria, Jake moved out of the school district and was no longer able to participate in the study.

Karen remained in the baseline condition for just over five weeks. Generally, she demonstrated low levels of greeting responses during classroom trials with the clear exception of one day during which she emitted appropriate greetings on four separate occasions. During classroom trials in the intervention phase, Day 1 resulted in greeting responses that were consistent with baseline conditions as she produced one of four correct greeting responses. Karen made a

clear transition toward prosocial responding at the point of intervention, demonstrating a steady increase in peer interaction when greeted by peer helpers within the classroom context. Her graph reveals three consecutive days of improved prosocial behavior within the classroom (i.e., four of four correct responses to peer greetings). Upon meeting target behavior criteria, one more classroom observation was conducted for Karen prior to her entering the follow-up condition. On this day, she sustained a high level of correct responding by demonstrating four out of four appropriate greeting responses to peers. Karen transitioned into the follow-up condition where she continued to demonstrate prosocial greetings at a much higher level than observed during baseline observations. Notably, this student exhibited four of four correct prosocial responses during both of her follow-up observations (see last two data points within panel 3).

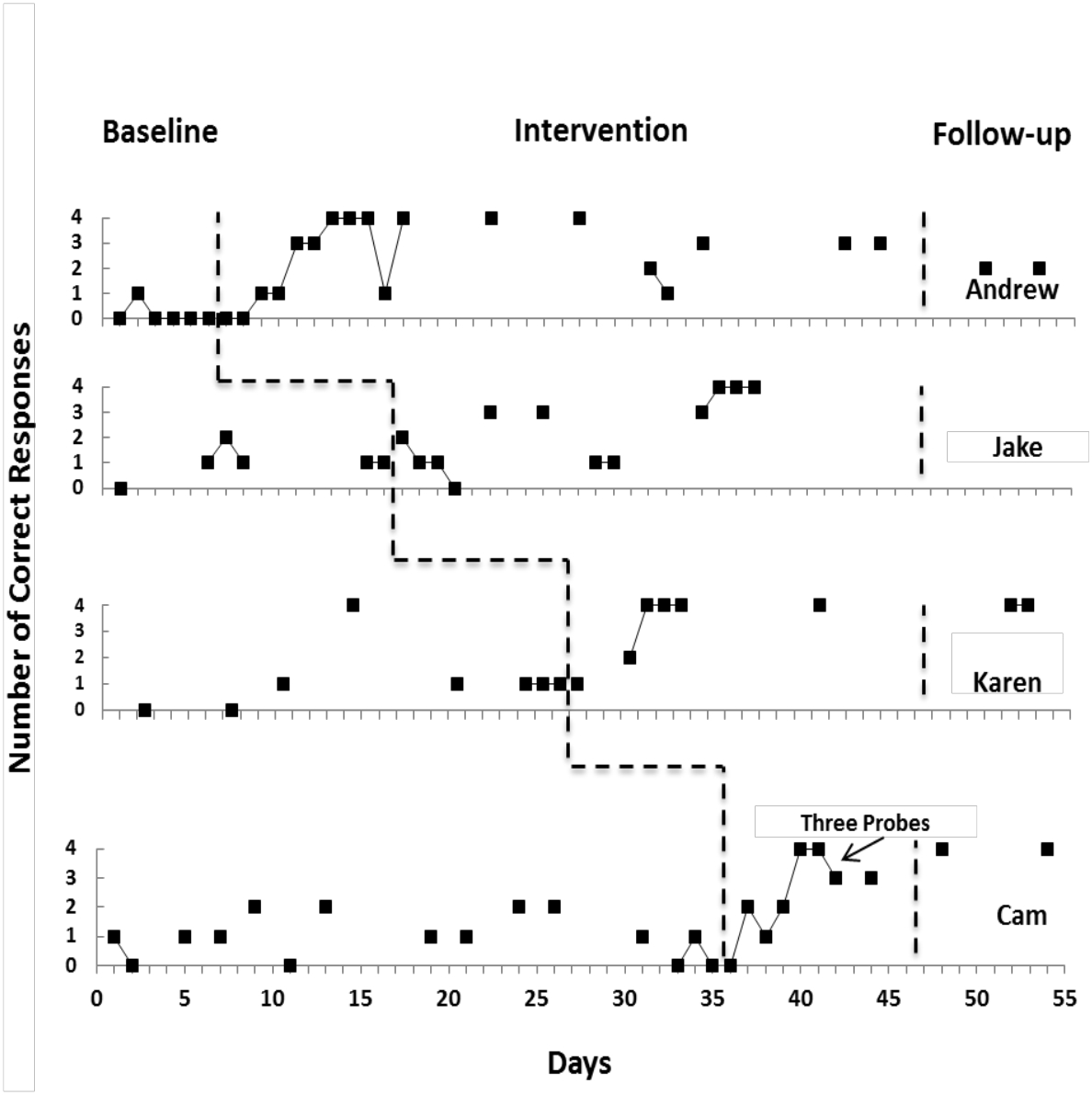

Figure 1. Participants' Greeting Responses to Peer Helpers in the Classroom

Cam entered intervention after a seven-week baseline phase, concurrent with Karen's meeting her target behavior criterion. He participated in the social story video treatment for over two weeks. During his first classroom trial, which occurred during treatment, he failed to respond to peer helpers; notwithstanding, his subsequent level of prosocial responses to peer helpers accelerated conspicuously.

Generalization probes were conducted during participants' passing periods and their lunch periods in the school cafeteria. Probes were limited to one observation per day during each of these periods. In Figure 2, these observations are illustrated as open circles (lunchroom) and open triangles (passing periods). Probes that were conducted in both locations on the same day are depicted as combined (bold) circles over triangles.

As can be seen in the top of Figure 2, Andrew's baseline level prosocial responding was at zero during his three baseline probes. However, during intervention, Andrew demonstrated an increased level of generalized appropriate responses to greetings within the lunchroom context. This level of generalized improvement was not observed during the passing periods. Of his two probes during follow-up, Andrew responded with a prosocial greeting in the lunchroom but not in the classroom.

Jake demonstrated a remarkable series of prosocial greeting responses in the lunchroom and passing period contexts during the intervention phase. On each of the five occasions during which his greeting behavior was probed, this student reciprocated with a prosocial greeting. His behavior is particularly noteworthy since 6 of his 6 improved levels of social responding occurred on two separate times/locations during the same days (see circles on triangles on Days 19, 31, and 37 in center panel of Figure 2). Unfortunately, we were unable to collect follow-up data as Jake withdrew from the school district on Day 37 of the study.

During her baseline condition, Karen exhibited mixed responses when her prosocial behavior was probed in the lunchroom and passing periods. Of the four probes in the lunchroom, Karen responded with several prosocial greetings. That is, prosocial responses occurred during three baseline probes conducted in the lunchroom and one baseline probe conducted during a passing period. Upon entering intervention, Karen did not immediately reciprocate prosocial responding (see first two probes in the lunchroom context). However, with only one exception, she responded with a prosocial greeting across the remaining probes during the intervention and follow-up conditions.

While in the baseline condition, Cam's prosocial responding to generalization probes occurred infrequently. Of the nine probes conducted during this participant's extended baseline condition, he reciprocated on only two occasions. Due to his extended baseline, Cam's exposure to treatment was comparatively abbreviated. Notwithstanding, during his two weeks in the treatment condition, he demonstrated prosocial greetings in both the lunchroom and passing periods (see combined passing period and lunchroom data points in Panel 4). As can be seen by the classroom data points on the right side of the lower panel of Figure 2, by Day 5 of treatment Cam achieved 4 out of 4 correct greeting responses. Thereafter, he made no fewer than three correct responses per day. Cam's prosocial behavior continued as he demonstrated 3 out of 4 correct greeting responses on Day 44 of this study. Thereafter, Cam entered the follow-up condition, where he sustained prosocial greetings at maximally high levels. Specifically, this student was observed performing 4 out of 4 correct prosocial responses during each of the observation sessions (see final 2 data points in Panel 4).

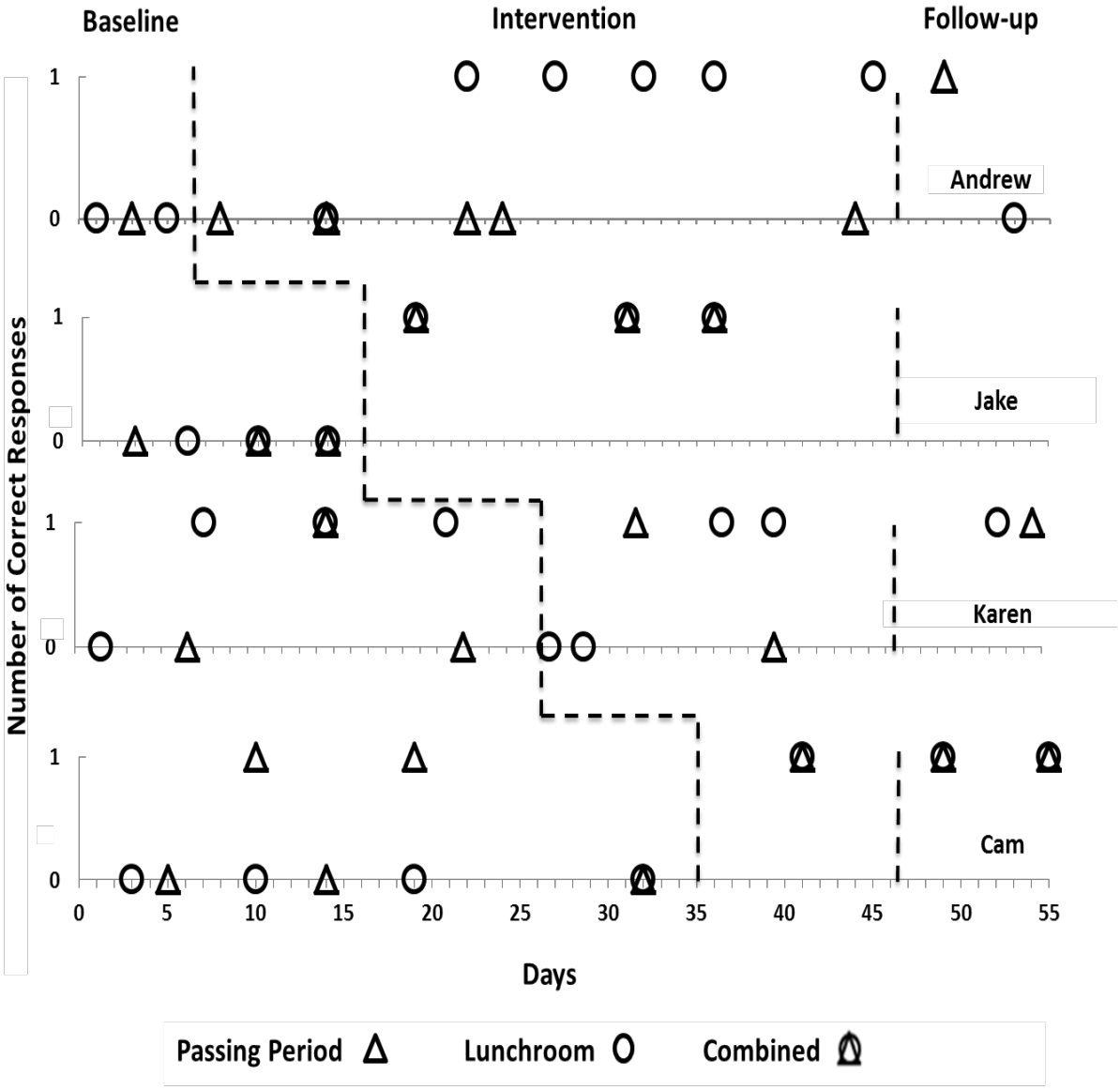

Figure 2. Participants' Greeting Responses to Peer Helpers in Generalization Settings

Discussion

Recent studies in the area of social stories have mentioned that the improvement in targeted behaviors may not have been achieved by the implementation of social stories "independently." The current investigation employed several recommendations from past researchers to contribute to social story efficacy. In addition, the use of an intervention presented via video that involved a reduction of stress on teaching staff and its implementation within the participants' natural school settings with limited disruption to routine suggest that social stories are a useful and practical tool.

The ecobehavioral approach. The current investigation confined treatment and assessment to inconspicuous but clearly-defined peer-interaction responses within the natural school setting. The intervention did not require major alterations in the participants' academic routines as the treatment entailed approximately one week of daily exposure to the social story video, requiring approximately two minutes per day (see Gray & Garand, 1993). We emphasized the measurement of student behavior during follow-up conditions and demonstrated that participants sustained high levels of prosocial responding even during the absence of continuing intervention. Consistent with an ecobehavioral approach, we sought to examine the efficacy of social stories independent of programmed contingencies employed in most social skills training packages (cf. Delano & Snell, 2006). As noted by Lutzker, Steed, and Huynen (1998), the primary difficulties with employing this model revolve around staging and monitoring the environment in the sense that "... it requires constant concerted efforts in staff training. The advantages, we feel, clearly outweigh the limitations" (p. 361).

Caveats. As described above, the current study attempted to incorporate recommendations from researchers as identified throughout the current literature (e.g., Kokina & Kern, 2010). Notwithstanding, results from the current investigation might be strengthened by implementing a few additional safeguards within the experimental preparations. For example, IOA in this study was conducted for a total of 23.9% of total observations across all participants. There was, however, a slight imbalance among IOA across each of the four individual participants. To preclude such observation artifacts, future studies might consider developing IOA observations in accordance with a more rigorously structured observation schedule. Although the current study had favorable results relating to the maintenance and generalization of the target behavior, a continuation of the study might have improved the extent to which generalization could have been demonstrated across time. Future research might be aimed at extending the number of observations during the follow-up condition.

Another challenge and limitation to this study was assuring that each participant viewed a social story video daily during intervention. Although each one complied and viewed a social story video the majority of the time during intervention, a few complications interfered with students who attended school regularly. For example, Cam had limited time during which he viewed the social story in the intervention condition.

Participant school attendance proved to be another limitation to this study. Jake and Karen presented a history of attendance problems that were somewhat challenging; however, they both met the intervention criteria of 4 out of 4 correct greeting responses across three consecutive days. Additionally, required weekly classroom probes were slightly affected due to teacher and participant absences, which restricted the required daily probes at the outset of this condition. Participant withdrawal from this study was a limitation that interfered with a complete analysis of the treatment's potential. Jake met target criteria then moved out of the school district, which precluded analysis of target behavior to generalize across time.

Peer helpers were assigned to each participant based on mutual enrollment in two specific classes. Although the possibility seems unlikely, under some conditions, such arrangements might contribute to a form of indirect practice between participants and peer helpers. Subsequent investigations might take this possibility into consideration. For example, follow-up studies might find it useful to employ a broader group of peer helpers to approach participants so that such potential artifacts are ruled out.

Indirect Evidence and Social Feedback

Participants viewed a social story repeatedly, coupled with voice over instruction of expected prosocial responses to peer greetings. When greeted by similarly matched peers in an overall representative environment consistent with the social story video, all four participants' greeting responses improved over time.

Greeting others and responding to others' greetings are important initial steps in developing spontaneous social interactions. Although this study was designed to examine the specific social skill of greeting responses, additional prosocial interactions by participants were observed by those who collected data, including generalization of the target behavior. Several participants exhibited prosocial behaviors not observed prior to the study, including greeting staff, initiation and response to peers who were not peer helpers in the study, and sitting with peers at lunch as opposed to eating alone. Other improvements reported by teaching staff who collected data in the classroom included observations of these students engaging in conversation and social chit chat with peers, and one participant was observed initiating a greeting outside of this study within the community setting. These unique pro-social responses, in addition to the improved targeted responses by participants, suggest that learning through observation or modeling was effective as described within social learning theory (cf. Bandura et al., 1969).

Recommendations for Future Studies

This study utilized an approach that defined and guided the practice of a very individual social skill viewed by teachers, administrators, family members, and other caregivers as difficult for the participants to perform in a spontaneous and natural manner. Although the present study included only four participants and employed a limited number of probes, the results appear most promising for future applied research in the critically important area of social stories as an intervention to improve social skills.

As highlighted at the beginning of this paper, it is not enough to initiate legislation to subsidize expanded and improved treatment programs if new treatment protocols are aimed at changing problem behaviors as they occur within the confines of a treatment setting (Campbell & Lutzker, 1993). Evidence-based outcomes must demonstrate behavior improvements that are sustained across natural settings, locations, time, and diversified conditions. Future research in this area should be directed at involving more participants, testing the intervention over longer durations in time, and evaluating the durability of the intervention in the training setting and a multitude of generalization settings for an extended time period. Such strategies might determine the duration effects (generalization across time) and the extent to which such effects transfer into other novel settings (Stokes & Baer, 1977). Variation in the generalization settings might provide evidence regarding the extent to which improved social responses are context specific or likely to transfer to a multitude of natural environments. Exploring the effectiveness of social stories given participants' ages, gender, cognitive functioning, language abilities social validity, differing levels of skill development, and various behaviors (Bledsoe et al., 2003; Kokina & Kern, 2010; Mancil et al., 2009) may be useful in order to assess and extend the external validity of the strategies employed in the current investigation (Campbell, 1957).

In the current investigation, the use of a video modeled social story as an intervention resulted in four participants exhibiting overall improvement in the social skill of greeting responses to peer helpers as displayed in Figure 1. In summary, the majority of participants demonstrated improved greeting responses in both generalization settings after entering the intervention condition. The

three students who participated in both the intervention and follow-up conditions exhibited enhanced greeting responses "across locations" and "across time" (Stokes & Baer, 1977). One of the more salient findings in the present study is that participants continued to exhibit high levels of appropriate greeting responses across time and locations in the complete absence of any form of ongoing treatment protocol.

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APPENDIX A

Using Social Stories to Improve Peer Interaction
Questionnaire

Student:_____
Teacher:_____

This student has limited social initiation skills with peers: YES NO (circle one)
This student has limited reciprocity in social interactions: YES NO (circle one)
This student tends to be less involved in typical peer groups: YES NO (circle one)

APPENDIX B

Peer Helper Nomination by Teacher

The peer helper is regarded as a role model student who has a disposition to be spontaneously and naturally social with his/her peers.

This individual would be a person to respect confidentiality.

These identified students attend the same class as the participant.

1. _____
2. _____
3. _____
4. _____
5. _____

APPENDIX C

Inter-Rater Reliability Form
Teacher Role-Play Training

Date:_____
Role-play between teachers and experimenter.

Target Behavior: The participant responds to a greeting by looking in the peer helper's direction and provides verbal response acknowledgement to the person.

Circle 'YES' for an acceptable Greeting Response
Circle 'NO' for an unacceptable Greeting Response

Trial 1:	**Trial 2:**	**Trial 3:**	**Trial 4:**	**Trial 5:**	**Trial 6:**
YES	YES	YES	YES	YES	YES
NO	NO	NO	NO	NO	NO

APPENDIX D

Observation Recording Form

Observation Location	**Student Response & Peer Helper**									
	Date:		**Date:**		**Date:**		**Date:**		**Date:**	
	Monday	**PH**	**Tuesday**	**PH**	**Wednesday**	**PH**	**Thursday**	**PH**	**Friday**	**PH**
Period										
Period										
Period										
Period										
Generalization										

Student Response:

1. Looks in direction of peer helper
2. Verbal Response
3. Nonverbal Response (e.g. waive, head nod)
4. No Response (NR)

Peer Helper (PH):

A.
B.
C.
D.

APPENDIX E

Social Stories

Participant Viewing of Social Story Video Verification Form

Baseline:

Date:	Participant watches the video: enter YES or NO

Intervention:

Date:	Participant watches the video: enter YES or NO

APPENDIX F

Social Validity Questionnaire

Please answer 'YES' or 'NO' to the following five questions:

1. Was the social skill of 'greeting responses' an important skill for the student to learn?

2. Were the procedures of the intervention appropriate to the setting at school?

3. Did you notice an improvement in the student's greeting responses as a result of using this social story intervention?

4. Was the intervention one that was fairly easy to implement in the classroom?

5. If students had a similar need in your classroom, is this an intervention that you could use again in the future?

6. Have you observed the student to use the greeting response skills that were taught during this study?

7. Do you have any comments related to the program?

APPENDIX G

Teacher Satisfaction with Social Story Implementation.

Social Validity Questions	Teachers' Responses
1. Was the social skill of 'greeting responses' an important skill for the student to learn?	4 out of 4 teachers: "yes"
2. Were the procedures of the intervention appropriate to the setting at school?	4 out of 4 teachers: "yes"
3. Did you notice an improvement in the student's greeting responses as a result of using this Social Story intervention?	4 out of 4 teachers: "yes"
4. Was the intervention one that was fairly easy to implement in the classroom?	4 out of 4 teachers: "yes"
5. If students had a similar need in your classroom, is this an intervention that you could use again in the future?	4 out of 4 teachers: "yes"
6. Have you observed the student to use the greeting response skills that were taught during this study?	4 out of 4 teachers: "yes"
7. Do you have any comments related to program?	
A teacher who recorded all classroom greeting responses of a participant provided this unsolicited comment. Given that the teacher had this participant in her class for two periods daily, she could covertly observe any spontaneous social initiations or responses this participant made with his/her peers.	"The Social Story intervention was such an easy program to implement and taught an essential skill to my student that I see him use each and every day!"
A teacher who recorded all classroom greeting responses of a participant provided this unsolicited comment. Given that the teacher had this participant in her class for two periods daily, she could covertly observe any spontaneous social initiations this participant made with his/her peers.	"I think it was a useful and meaningful intervention and would like to see a similar video program implemented to address other social situations the students will encounter during class."
A teacher who recorded all classroom greeting responses of a participant provided this unsolicited comment. Given that the teacher had this participant in her class for two periods daily, she could covertly observe any spontaneous social initiations or responses this participant made with his/her peers.	"It was very easy to do and it even helped others talk to someone they normally would not talk to at school."