Impact of Milieu Teaching on Communication Skills of Young Children with Autism Spectrum Disorder

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Abstract
This 5-month study examined the impact of a behaviorally based naturalistic teaching strategy, milieu teaching, on the communication skills of preschool-aged children with Autism Spectrum Disorder (ASD) in an early childhood special education (ECSE) classroom. A multiple baseline across participants design was used. Communication targets were selected based on each child’s Individualized Education Plan. Milieu teaching strategies were implemented in two activities per day per target. Generalization and maintenance effects were also determined. Results indicated that milieu strategies are an effective means of providing communication skills instruction for young children with ASD in an ECSE classroom.

Keywords
Autism Spectrum Disorder, milieu teaching, naturalistic strategies, early

Early childhood special educators serving children with Autism Spectrum Disorder (ASD) face the significant challenge of meeting the complex communication needs of this population through specialized, intensive instruction that also reflects recommended practices for young children with disabilities within early childhood special education (ECSE) classrooms. This challenge has become more pressing as the population of school-aged children diagnosed with ASD increases yearly.

Support exists for intensive and specialized early intervention to improve communication skills for young children with ASD (Dawson & Osterling, 1996; Handelman & Harris, 2001; National Research Council, 2001). Although the need for services is evident, the exact form of the instruction is less clear. Current reviews of research have indicated that a variety of strategies have a positive impact on the communication skills of young children with ASD (National Autism Center, 2009; National Research Council, 2001). Relying on evidence that supports the use of applied behavior analysis, many practitioners and parents support the use of teacher-directed, one-on-one therapy (Steege, Mace, Perry, & Longenecker, 2006). Current best practice for instructing young children with disabilities emphasizes the importance of the natural environment (Bruder, 2010). Thus, the challenge for the early childhood special educator becomes twofold, providing effective instructional strategies for the child with ASD to facilitate communication skills and implementing these strategies within a classroom that reflects recommended practices for all young children with special needs.

Traditional behavioral strategies, specifically discrete trial training (DTT), have a substantial research base indicating their effectiveness. Lovaas (1987) implemented an instructional program stemming from behavioral principles of operant conditioning characterized by intensive, one-on-one instruction in stimulation-free environments that addressed specific, isolated skills. Since then other researchers have reported positive outcomes following intensive DTT programs (Birnbrauer & Leach, 1993; Sheinkopf & Siegel, 1998; Smith, Groen, & Wynn, 2000). In a comprehensive review of literature, Goldstein (2002) concluded that a discrete trial format positively impacted the communication skills of individuals with ASD, primarily those under the age of 8. Specifically, children began using single words and phrases without prompts after receiving this intervention.

Despite its success, practitioners have argued that DTT may not be the most suitable means by which to address the significant communication deficits of individuals with ASD.
Professionals have suggested that the isolated nature of DTT instruction often results in limited generalization of newly acquired skills (Cowan & Allen, 2007; Strain & Schwarz, 2001). As a result, while children may acquire complex communication skills with therapists in specific settings, they do not use basic communication among natural partners in their daily lives. Furthermore, practitioners have argued that no evidence exists to suggest DTT is more effective than other forms of communication intervention (Simpson, 2005) and, therefore, the costs of such programs are unjustified (Gresham & MacMillan, 1997). Finally, reflecting the trend in special education services for all ages, ECSE practices emphasize embedded instruction in natural environments (Odom & Wolery, 2003). As a result, many practitioners have concluded that DTT is incompatible with ECSE practices (Odom, 2000).

The Council for Exceptional Children’s Division of Early Childhood published recommendations for quality ECSE classrooms that promote the intentional use of specialized instruction within the child-centered practices of early childhood classrooms (Sandall, McLean, & Smith, 2000). Their recommendations include the understanding that learning stems from child initiation and that young children acquire skills more rapidly when they are motivated by activities (Bricker, 2000). Early childhood professionals stress the importance of delivering services in natural environments with natural partners, with a growing recognition that free play is a powerful setting for intervention and learning (Bruder, 2010). Finally, ECSE should be driven by individualized, research-based instruction (Bricker, 2000). This combination of factors, emphasizing child initiation in the natural environment as well as specialized instruction, has led to a learning environment that is characterized by both structured and unstructured activities. Structured activities that are carefully planned and teacher directed allow educators to provide intensive practice. Unstructured activities, characterized by child-directed experiences, provide opportunities for skill practice in natural settings, taking advantage of a child’s interests and motivation.

At first glance, the nature of traditional behavioral strategies appears at odds with the blend of teacher- and child-directed activities that characterize quality ECSE programs. A possible solution is milieu teaching in which teachers implement behaviorally based strategies within the naturally occurring routines of the classroom. Educators can provide specialized communication instruction for the child with ASD while maintaining an appropriate learning environment for all young children with disabilities. Milieu teaching includes a package of four behaviorally based strategies that are used by teachers or parents in normally occurring daily routines to address communication objectives. These strategies include model, mand-model, time delay, and incidental teaching (Alpert & Kaiser, 1992).

A substantial research base exists to support the use of milieu strategies with individuals with disabilities. Natural communication partners have successfully learned and implemented milieu teaching with children in at-risk families (Peterson, Carta, & Greenwood, 2005) as well as with individuals with disabilities other than ASD (Warren, 1992; Warren & Bambara, 1989; Warren & Gazdag, 1990; Warren, Gazdag, Bambara, & Jones, 1994). Parents have used milieu teaching in both clinic (Alpert & Kaiser, 1992; Hemmeter & Kaiser, 1994; Kaiser, Hemmeter, Ostrosky, Alpert, & Hancock, 1995) and home settings (Alpert & Kaiser, 1992; Kaiser et al., 1995; Peterson et al., 2005). In addition, Hancock and Kaiser (1996) demonstrated that siblings of children with language delays effectively implemented these strategies in ongoing play activities. Finally, classroom teachers have been trained to implement milieu teaching with individuals with disabilities in classroom settings (Kaczmarek & Hepting, 1996; Rodi & Hughes, 2000; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002).

Research specifically targeting the efficacy of milieu teaching with children with ASD has demonstrated that milieu teaching increases the use of specific language targets when implemented by therapists in clinic settings (Hancock & Kaiser, 2002) and parents in clinic and home environments (Kaiser, Hancock, & Nietfeld, 2000). Recently, Olive et al. (2007) demonstrated the efficacy of milieu teaching when implemented by trained teachers on the use of voice output communication aids among three children with ASD in an elementary special education classroom.

Although research supports the use of milieu strategies with young children with ASD to improve communication skills, there is little research on the effectiveness of these strategies when implemented in typical environments. This study examined the effect of teacher-implemented milieu strategies on the communication skills of young children with ASD when incorporated into typically occurring activities throughout the school day. Specifically, this study addressed the following questions:

1. Do teacher-implemented milieu teaching strategies incorporated throughout typical classroom routines in an ECSE classroom positively impact the communication skills of young children with ASD?
2. Will improvements in the communication skills of young children with ASD generalize to novel activities?
3. Will improvements in the communication skills of young children with ASD be maintained over time?

**Method**

**Participants**

Three children who attended a small public charter preschool serving children from ages 2 through 5 were selected to participate in this study. The school housed a state-funded voluntary prekindergarten. The remaining two were ECSE
classrooms—one for children aged 2 and 3 and one for children aged 4 and 5. Services were provided for 4 hr daily, 4 days a week, and 180 days per year. The participants were all served in the preschool classroom for 4- and 5-year-old children with varying exceptionalities. One classroom teacher and one teacher assistant taught 7 students (i.e., 5 children diagnosed with ASD, 1 child with cerebral palsy, and 1 child with Down syndrome). All participants received integrated speech and language therapy services four times each week for 30-min sessions.

The following criteria were used to select participants for the study: (a) between 3 and 6 years of age, (b) a score in the autistic range on the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1993), (c) no known vision or hearing impairment, (d) participation in a federally funded ECSE program, (e) regular attendance, and (f) parental consent. Three children met all criteria.

Nick. Nick was a 4-year, 11-month-old boy with a CARS score of 32, placing him in the mild/moderate autistic range. He had attended the current preschool for 5 months this school year and a different preschool the previous school year, where he had also received speech and language therapy. For the past 2 months, he had been receiving private academic instruction in his home for 6 hr per week. Nick’s primary mode of communication was whining or crying. He was able to follow one-step verbal directions and often repeated phrases. When prompted with a question, Nick typically responded by repeating the question (e.g., Do you need to go potty?). Nick would repeatedly slap objects when he was excited, upset, or happy.

Mary. Mary was a 5-year, 4-month-old girl with a CARS score of 38.5, placing her in the severe autistic range. She had attended the current preschool program for 15 months (i.e., 10 months the previous school year and 5 months this school year). Previously, she had attended a private school in another state for children with hearing impairments. Within predictable, structured routines, Mary used multiple word phrases appropriately to request and comment, including descriptive words. She answered questions appropriately and followed multistep directions. However, these skills did not generalize to novel settings or unstructured routines. Although Mary required prompting to play with peers, she appeared to enjoy cooperative play. She occasionally became upset and cried when her routine was altered.

Carl. Carl was a 5-year, 6-month-old boy who had received a CARS score of 45.5, placing him in the severely autistic range. He had attended the current preschool program for 2 months with no previous formal early intervention services. Carl’s expressive language was limited to words and phrases repeated without apparent purpose. He frequently used jargon. He had difficulty attending to tasks in the classroom and rarely responded appropriately to verbal requests. Carl preferred solitary play and played appropriately with toddler toys. He did not functionally participate in turn-taking games or activities. Carl frequently had behavior “meltdowns” defined by his teacher as crying, kicking, and biting himself and others. He was described as a very active child who was carefully supervised to ensure his safety.

Setting

Intervention took place during daily activities in the 4- and 5-year-old ECSE class. Data were collected in a structured activity (i.e., teacher-led circle time) and an unstructured activity (i.e., teacher supervised free play on the playground). In addition, generalization data were collected during unstructured free play in the multipurpose room.

Milieu Teaching Strategies

The independent variable was a package of behaviorally based strategies known as milieu teaching, an instructional intervention targeting communication deficits among children with disabilities and those from at-risk environments (Alpert & Kaiser, 1992). The strategies included (a) modeling, (b) mand-model, (c) time delay, and (d) incidental teaching.

In milieu teaching, the modeling procedure is used during the initial phase of skill acquisition. The teacher first establishes joint attention then presents a verbal or gestural model related to the student’s interest. If the child imitates the model, immediate social praise and the desired object or activity are presented to the child. If the child fails to imitate the model, a second model and opportunity to respond are provided. Another incorrect response results in corrective feedback and immediate delivery of the desired object or activity.

The primary purpose of the mand-model procedure is to encourage generalization and functional use of an emerging target skill. After noting child interest, the child is presented with a verbal mand (e.g., “Tell me what you want”). A correct response is followed by social praise and access to the preferred object or activity. An incorrect response is followed by a second mand, if the student’s attention is high, or a model, if the student’s interest is waning. If the child fails to respond appropriately after the second model or mand, corrective feedback is given followed by social praise and access to the desired object or activity.

Although traditional explanations of milieu teaching include the use of two models or mands during the first two procedures, Kaiser and Grim (2006) suggested that, with children with ASD, the teacher should abbreviate the milieu procedures to keep the child focused. As a result, the modeling and mand-model procedures were modified in the study by eliminating the second model or mand-model. Specifically, if the child failed to respond or responded incorrectly after the first model or mand-model prompt, the teacher provided corrective feedback followed by social praise and access to the object or activity.

In milieu teaching, the time delay procedure is implemented to encourage the spontaneous use of emerging target skills.
The teacher responds to a child’s interest in an activity or object by pausing for 5 seconds prior to implementing a model or mand-model procedure. A correct response results in immediate praise, verbal expansion, and access to the desired object or activity. An incorrect response is followed by the mand-model procedure, if interest is high, or the model procedure, if interest is waning and the student is unlikely to know the response.

All three previously described procedures are used within the framework of the fourth strategy, incidental teaching that emphasizes student requests. With this strategy, the teacher carefully structures the environment to encourage student requests. For example, if a child has shown interest in a particular toy, the teacher ensures that the toy is present during a preselected activity. Then if a child demonstrates interest in obtaining an object or activity, the teacher implements an appropriate milieu strategy: modeling, mand-model, or time delay.

Teacher Training

The classroom teacher had 13 years of total classroom experience. She taught general education for 10 years in preschool, kindergarten, and first-grade classrooms before taking the position at the current school. She was in her third year teaching an ECSE classroom for 4- and 5-year-old children with varying disabilities. She gained her special education certification by passing the state examination and had previously received training in behavioral techniques during a summer school program for children with ASD.

Training in the four milieu strategies was provided to the classroom teacher based on previously documented procedures (Charlop-Christy & Carpenter, 2000; Hemmeter & Kaiser, 1994; Kashinath, Woods, & Goldstein, 2006; Laski, Charlop, & Schreibman, 1988; Wolery et al., 2002). Prior to the initial training session, the teacher was provided with a written overview of the four core milieu teaching strategies. This was followed by two 90-min one-on-one sessions conducted by the first author that included (a) a discussion of milieu teaching, (b) modeling of the strategies by the first author; and (c) role playing in which the teacher demonstrated the strategies followed by praise or corrective feedback. Finally, the teacher practiced using the strategies during two classroom activities twice weekly over 2 weeks with children who were not participating in the study. The first author provided specific praise and corrective feedback.

Experimental Design

A single-subject study was employed using a multiple baseline across participants design in two activities, a structured circle time activity and unstructured free play on the playground. A third activity, unstructured play in the multipurpose room, was selected for generalization probes.

The dependent variable was spontaneous occurrences of the communication targets. Spontaneous occurrences were defined as child-initiated communication occurring in the absence of a model or mand-model within an instructional sequence. An instructional sequence included (a) the presentation of materials with or without a prompt, (b) a response, no response, or incorrect response, and (c) delivery of materials with or without corrective feedback.

Individual communication targets were selected for each participant based on the expressive communication goals and objectives from each child’s Individual Education Program and a teacher interview. Carl’s target was the one-word request, “bubbles”; Nick’s target was the multiple-word request, “blow bubbles”; and Mary’s target was the appropriate use of the pronoun “me”, as in the sentence “Give me bubbles.”

Data Collection

During baseline and intervention, data were collected for each participant twice weekly in two activities. In structured circle time, data collection took place during two songs in which all students had opportunities to use their selected targets. Together, both songs lasted approximately 10 min. During unstructured playground play, data collection began following the first 30 s of the selected activity and continued for 10 min. Because teacher prompts were part of the intervention, baseline data were not collected for prompted responses. Intervention and maintenance data were collected on both prompted and spontaneous responses. Three generalization probes were conducted in a third activity within each phase: baseline, intervention, and maintenance. In the generalization activity, data were collected on both prompted and spontaneous responses and began following the first 30 s of the activity and continued for 10 min. Maintenance data were collected for each participant in the intervention and generalization activities two weeks following the conclusion of the intervention phase.

Procedure

Baseline. During baseline, children participated in structured circle time and unstructured free play on the playground. During circle time, the teacher included an activity that involved bubble blowing but did not require student participation or requesting. On the playground, the teacher held a bubble bottle and blew bubbles periodically. She did not require a student request prior to blowing bubbles.

Intervention. During intervention, milieu strategies were implemented in a structured activity (teacher-led circle time) and an unstructured activity (free play on the playground). During the 10-min structured activity, the teacher provided two opportunities for each child to request bubbles. Children
also were allowed to spontaneously request bubbles outside of an assigned turn.

In the unstructured playground activity, the bubbles were available for the beginning 10 min of the activity. The teacher held the bubbles and bubble wand as she walked around the playground, and children had the opportunity to request bubbles. When requested, the teacher blew bubbles through the bubble wand once. Other activities available on the playground included swings, slides, climbing equipment, sand and sand toys, and a seesaw.

During the study, milieu strategies were implemented using the following procedures. A model prompt was defined as the teacher saying the target (e.g., “bubbles”). A mand prompt was defined as the teacher verbally instructing the student to request (e.g., “Tell me what you want”). Corrective feedback was defined as repeating the model prompt (e.g., “bubbles”). Correct responses were immediately followed by bubbles.

In the first intervention session in both activities, the teacher presented the materials with a model prompt. A correct imitation was followed immediately by the presentation of bubbles. An incorrect or no response within 5 s was followed by corrective feedback and then bubbles. In the following sessions, if a child responded to the model prompt with 100% accuracy in a session, the teacher moved to the mand-model procedure in the following session. Specifically, the teacher presented the bubbles with a mand such as, “Tell me what you want”. An incorrect or no response within 5 s was followed by a corrective model prompt and then the bubbles. After an intervention session during which a child responded to the mand-model with 100% accuracy, the teacher moved to the time-delay procedure in the following session. Specifically, the teacher presented the bubbles and paused for up to 5 s, looking expectantly at the child. No response or an incorrect response was followed by a model prompt. If the child did not respond within 5 s or responded incorrectly, the teacher provided a corrective prompt and presented the bubbles. Incidental teaching procedures were used if a child-initiated communication.

The structured and unstructured activities were treated as separate conditions. For example, if a student responded to a milieu strategy with 100% accuracy in the structured activity, but not in the unstructured activity, the teacher would only move to the next milieu strategy in the structured activity. Responses that followed a model or mand-model prompt were recorded as prompted responses. Responses that followed an initial pause of 5 s or less were considered spontaneous.

Generalization. A third routine, unstructured play in the school’s multipurpose room, was selected to measure the generalization of communication targets. In this activity, bubbles were available for the first 10 min of the activity. The teacher held the bubbles and bubble wand and waited for a child to make a request before blowing bubbles. Other activities present in the multipurpose room included tricycles, scooters, balls, a hammock swing, a trampoline, blocks, and a ball pit.

Maintenance. At the end of the intervention phase, the teacher removed the materials used to elicit the target phrases. During the structured circle time activity, the teacher continued to sing the same songs; however, bubbles were not available. Similarly, during the unstructured playground activity, the teacher did not provide bubbles as a choice. Two weeks following the conclusion of the intervention phase, the teacher reintroduced the bubble activity in all settings.

Interobserver Agreement

Over the course of the study, two observers (i.e., the first author and a graduate student) were trained in data collection procedures and noted the occurrences of both prompted and spontaneous use of targets. During 28% of the total observations, the second observer was present in the classroom. Because the number of participant responses could be of any value, the researcher calculated interobserver agreement (IOA) based on a frequency ratio, dividing the smallest observed total by the largest and multiplying by 100 (Kazdin, 1982).

Fidelity of Implementation

Two procedures were conducted to ensure fidelity of implementation of the milieu strategies. The first author was present throughout the study and provided suggestions to the teacher, after the school day, regarding her use of the strategies. In addition, a fidelity checklist was provided to the teacher during initial training and was completed by the first author on two occasions during intervention. The 17-items checklist defining the four milieu strategies was developed based on the procedures outlined by Alpert and Kaiser (1992).

Results

Data are displayed in line graphs showing spontaneous occurrences of communication targets for the structured circle time activity (see Figure 1) and the unstructured playground activity (see Figure 2) for baseline, intervention, and maintenance phases. Data for prompted responses are also displayed for intervention and maintenance phases (see Figures 1 and 2). Generalization data are displayed separately (see Figure 3). Data were analyzed through visual analysis based on (a) comparison of grand means across participants, (b) changes in the level of performance, (c) trends in performance, (d) time between the onset of the intervention and the change in behavior, and (e) percentage of overlap between data points in baseline and intervention (Alberto & Troutman, 2006).
Figure 1. Frequency of spontaneous and prompted occurrences of participants’ targets and mean lines of prompted and spontaneous targets in the structured circle time activity.
Note: Δ = prompted responses; O = spontaneous responses; — = mean of prompted responses; --- = mean of spontaneous responses
Figure 2. Frequency of spontaneous and prompted occurrences of participants’ targets and mean lines of prompted and spontaneous targets in the unstructured playground activity.

Note: Δ = prompted responses; O = spontaneous responses; — = mean of prompted responses; --- = mean of spontaneous responses
Figure 3. Frequency of spontaneous and prompted occurrences of participants’ targets in the generalization activity. Note: Δ = prompted responses; O = spontaneous responses; — = mean of prompted responses; --- = mean of spontaneous responses.
**Intervention**

**Structured activity.** In the structured circle activity, no participants used their targets spontaneously during baseline (see Figure 1). All participants began to use their targets spontaneously within four intervention sessions resulting in grand means of 0.99 across participants during intervention and 1.78 during maintenance. During intervention and maintenance, all participants demonstrated prompted responses with grand means of 1.33 across participants in intervention and 0.22 in maintenance.

During the structured circle activity, Nick’s spontaneous communication increased initially then declined somewhat and remained variable throughout intervention. The percentage of overlap between data points from baseline to intervention was 3.70% and from baseline to maintenance was zero. The trends for both prompted and spontaneous communication during intervention were negative and during maintenance were stable. After the second intervention session, Mary’s spontaneous communication remained at a high and variable level until approximately midway through the intervention phase when they were used at a high and consistent rate. The percentage of overlap for spontaneous communication from baseline to intervention was zero and from baseline to maintenance was zero. The trend for spontaneous communication was positive during intervention. The trend for prompted responses during intervention was negative. Because only one data point was collected for Mary during maintenance, trend data were not applicable. The second participant, Carl, began using his target phrase spontaneously in the third intervention session and continued at a high and variable rate. For Carl’s spontaneous communication, the percentage of overlap between data points from baseline to intervention was 0 and from baseline to maintenance was 33.3% with a positive trend during intervention and a negative trend during maintenance. The trend for prompted responses during intervention was negative and during maintenance was positive. Thus, a positive change in spontaneous communication in the structured circle activity occurred at the point of intervention for all participants demonstrating a functional relationship between spontaneous use of communication targets and the teacher’s implementation of milieu strategies.

**Unstructured activity.** In the unstructured playground activity, no participants used their targets spontaneously during the baseline phase (see Figure 2). All participants used spontaneous communication within two intervention sessions resulting in a grand mean across participants of 5.56 during intervention. During maintenance, all participants continued to use spontaneous communication in the unstructured playground activity with a grand mean across participants of 4.22. All participants demonstrated prompted responses in the first session of the intervention phase resulting in a grand mean of 1.53 across participants during intervention and of 0.33 during maintenance.

Nick’s spontaneous use of the target demonstrated a level change within two intervention sessions and remained at a high and variable rate throughout the intervention phase. Percentage of overlap between data points from baseline to intervention was 11.10% and from baseline to maintenance was 33.3%. The trend in spontaneous communication was positive during intervention and positive during maintenance. The trend in prompted responses was negative during intervention and was stable during maintenance. The second participant, Mary, used her target phrase spontaneously following the second intervention session and use continued at variable and high rates. For spontaneous communication, the percentage of overlap between data points from baseline to intervention and from baseline to maintenance was zero. During intervention, the trend for both spontaneous and prompted use of the target phrase was negative. Carl, the third participant, showed spontaneous use of his target in the second intervention session, demonstrating a positive level change. Carl’s spontaneous use of his target was highly variable. For spontaneous communication, the percentage of overlap between data points from baseline to intervention was 6.67% and from baseline to maintenance was 33.3%. The trend in both spontaneous and prompted communication was negative during the intervention phase. During maintenance, the trend for his prompted responses was stable and his spontaneous communication was positive. As with the structured activity, the positive change in spontaneous responses in the unstructured activity at the point of intervention for all participants demonstrated a functional relationship between the participants’ use of communication targets and the teacher’s implementation of milieu strategies.

**Generalization**

Participants’ spontaneous and prompted use of communication targets in a third setting, the multipurpose room, is displayed in Figure 3. Although all participants used spontaneous communication at high rates in the generalization activity, observations in the multipurpose room were not staggered across time. Therefore, any relationship between the use of milieu strategies and the generalized use of communication targets is correlational.

No participants used their targets spontaneously during baseline. All participants used spontaneous communication during intervention and maintenance with a grand mean of 7.17 across participants during intervention and 4.43 during maintenance. Prompted responses were also used in the generalization activity with grand means of 0.33 across participants during intervention 0.47 during maintenance.
Maintenance

Two weeks following intervention, all participants continued to use spontaneous communication in all three settings (see Figures 1 and 2). Nick used the target phrase spontaneously in both circle time and playground and required no prompts. In circle time, the mean number of spontaneous responses was 2 with a range of 2. On the playground, the mean number of spontaneous responses was 3.33 with a range of 0 to 7. Due to absences, Mary was observed only once during the maintenance phase. During this session, she used the target phrase twice spontaneously during circle and 5 times spontaneously on the playground with one response following a mand-model prompt. The mean number of Carl’s prompted responses in circle time was 0.66 with a range of 0 to 2. The mean number of spontaneous responses was 1.33 with a range of 0 to 2. On the playground, Carl’s mean number of prompted responses was 0, and the mean number of spontaneous responses was 4.33 with a range of 0 to 8.

IOA

Agreement checks were conducted by two individuals on 28% of the trials distributed across phases. IOA was calculated based on a frequency ratio and averaged 94.5%, with 94% agreement on spontaneous occurrences of targets and 95% agreement on prompted occurrences of targets.

Fidelity of Implementation

Twice throughout intervention, the researcher observed the classroom teacher as she implemented milieu strategies within the context of one of the two selected activities. On both administrations of the milieu strategies implementation checklist, fidelity of implementation was 100%.

Discussion

The purpose of this study was to examine the effectiveness of milieu strategies as a communication intervention for young children with ASD in an ECSE classroom. This study demonstrated that milieu teaching increased spontaneous speech in three children with ASD providing additional evidence for the use of milieu strategies to teach communication skills to individuals with disabilities (Alpert & Kaiser, 1992; Hemmeter & Kaiser, 1994; Kaiser et al., 1995) and specifically those with ASD (Hancock & Kaiser, 2002; Kaiser et al., 2000). With careful planning, milieu strategies appear to be a practical means for teachers to provide meaningful instruction to young children with ASD in a variety of typical classroom activities. In addition, milieu strategies may represent an alternative to DTT as a cost-effective communication intervention for young children with ASD within ECSE classrooms supporting current recommended practice that emphasizes natural environments and the importance of generalization.

Results indicated that milieu strategies, when implemented by a child’s classroom teacher in the typically occurring activities of the school day, make meaningful change in the child’s communication skills. Following the implementation of milieu strategies, all participants demonstrated the spontaneous communication in three settings, including the generalization setting. Practitioners stress that programming for individuals with ASD should emphasize functional, spontaneous communication (Dawson & Osterling, 1996; National Research Council, 2001) that can be generalized to new settings (Cowen & Allen, 2007; Strain, 2001).

Although the implementation of milieu strategies had a positive impact on spontaneous communication, the results varied from activity to activity. The variability in student performance may be due to the important role that motivation plays in the behavior of children with ASD. Researchers have demonstrated that a variety of factors, including novelty (Dunlap & Koegel, 1980) and predictability (Dawson & Osterling, 1996), impact motivation and, therefore, the rate of skill acquisition of individuals with ASD. Structured teacher-led activities, such as circle time, provide a predictable environment, which may be motivating to some students, like Mary and Carl. However, other students, like Nick, may lose interest in predictable activities over time and engage in high rates of self-stimulatory behaviors. In unstructured activities, student responses are not limited by teacher-led routines, but teachers must be aware of competing activities and must intentionally manipulate the environment to create activities that will both engage students and elicit specific communication objectives.

In addition, milieu strategies appeared to be feasible within a typical classroom setting as supported by the classroom teacher’s ability to learn and successfully implement milieu strategies. ECSE teachers have expressed concern regarding the need for knowledge and training to serve children with ASD in their classrooms (Kasari, Freeman, Bauminger, & Alkin, 1999). Teacher implementation of milieu strategies could provide a viable and cost-effective means for teachers to provide communication instruction for children with ASD within ECSE classrooms.

Although this study demonstrated the positive impact of milieu strategies, several limitations must be considered. First, in the structured circle time activity, participants’ opportunities to use their targeted responses appeared limited by the nature of the teacher-directed activity. Specifically, the teacher provided only two opportunities for participants to use their targeted responses within the context of a turn-taking activity.

A second limitation of this study lies in the selection of participant targets. Targets were selected based on one set of materials, bubbles. As a result, the students may have lost...
interest in the materials and activities associated with this target, possibly resulting in a decline in performance.

Third, the selection of specific responses rather than a general class of responses limited the ability of the researcher to note correct responses that were functionally appropriate but that differed in form from the selected targets (i.e., “blow bubbles” instead of “give me bubbles”). A more functional and, therefore, socially valid dependent variable may be the selection of exemplars of a target type rather than specific words or phrases.

Finally, treatment integrity was determined through a checklist completed solely by the first author. IOA checks did not occur. A more accurate reflection of the fidelity of treatment should include this information.

This study adds to the limited body of research exploring the impact of milieu strategies on the communication skills of individuals with ASD in the context of typical environments. Additional research is warranted to further explore the feasibility of implementing milieu strategies in structured and unstructured activities throughout the school day, the impact of multiple practice opportunities on rapidity of behavior change, the result of using daily instruction for multiple exemplars of target skills, the feasibility of teaching a variety of individuals the use of milieu strategies as well as the impact of multiple communication partners on children’s communication skills, and the implementation of these strategies in an inclusive preschool environment by an early childhood teacher.

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