The Use of Visual Supports to Facilitate Transitions of Students with Autism

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A combination of visual supports for two elementary-age boys with autism was evaluated. The visual supports were used to aid transitions from one activity to another in community and home settings. The effectiveness of the visual supports was assessed using single-subject reversal designs (ABAB). The data revealed a significant decrease in the latency between the time the students were given instructions and the time they began the next activity when the visual supports were used. Visual supports also resulted in a significant decrease in teacher-delivered verbal and physical transition prompts required for one of the students.

Individuals with autism spectrum disorders (ASD) are frequently recognized for their difficulty in understanding, recalling, and using verbal information (Hodgdon, 1995). Case studies and studies of learning profiles have indicated that individuals diagnosed with ASD commonly experience problems in organizing their environments and thoughts and in processing auditory stimuli (Grandin, 1995; Schopler, Lansing, & Waters, 1983; Schopler, Mesibov, & Hearsey, 1995; Schuler, 1995). Indeed, there is some evidence that individuals with ASD are able to process two- or three-dimensional visual supports more easily than transient input, such as auditory stimuli (Quill, 1995a). Temple Grandin (1995), an articulate individual with autism, contended that people with autism are visual thinkers, and, therefore, practitioners should avoid relying on auditory channels for disseminating information. Grandin reported that she thinks in still pictures and videos and is unable to retain language-based information without visualizing pages in a book or a similar concrete representation of the concept. One example she gave is imagining personal relationships as glass doors. They "must be approached gently because barging forward too quickly may shatter the door" (p. 36). Schuler (1995) concurred that many individuals with autism have difficulty processing and retaining nonvisual information.

Visual supports are used to aid children with autism to maintain attention, understand spoken language, and sequence and organize their environments (Hodgdon, 1995). Hodgdon (1995) described visual supports as tools used to compensate for difficulties in attention, auditory processing, sequencing, and organization. She contended that children with ASD display fewer behavioral problems and increased compliance when visual supports are used to communicate expectations. In a similar context, Dalrymple (1995) argued that "when concrete information is in place about the day's or week's events, it is far easier to explain change than having to rely on verbal explanations alone" (p. 252). Transitioning between activities and settings can be difficult for students with ASD, causing confusion resulting from unpredictability (Earles, Carlson, & Bock, 1998). Accordingly, Hodgdon (1995) said, "Providing children with a schedule of events will produce one of the greatest returns for the effort when setting up a smoothly running classroom" (p. 270).

Current literature suggests the need for visual supports for students with autism, including assisting them with social interaction, organization, and communication problems (Gray & Garand, 1993; Heflin & Simpson, 1998; Kutter, Myles, & Carlson, 1998; Quill, 1995b; Simpson & Myles, 1998). For instance, Heflin and Simpson (1998) noted that visual supports allow students to make sense of their environments, predict scheduled events, comprehend expectations placed on them, and anticipate changes made throughout the day. Quill (1995b) described the use of visually cued instruction (i.e., visual supports), including pictographic symbols and written explanations, as an effective tool to foster organization, facilitate communication and social development, and manage challenging behaviors. In a related fashion, Simpson and Myles (1998) observed that visual supports build on the

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desire of students with ASD for predictability, order, and consistency.

Several strategies have been used to provide transitional support. For instance, Earles et al. (1998) recommended the combined use of visual scheduling and a "finished" box (i.e., for placing completed items). Another strategy involves the use of a visual warning device to alert the student to the time remaining in a scheduled activity (Earles et al., 1998). These visual tools can also be used to aid individuals with autism in sequencing and performing tasks independently, by listing steps of a task pictorially or in writing (Hodgdon, 1995). They are amenable to individualization; therefore, they can be used with a variety of students with varying cognitive and social abilities.

Visual support systems for individuals with ASD are commonly used and promoted (Earles et al., 1998). However, in spite of such widespread use, there is relatively little empirical support for wide-scale adoption of visual supports. That is, much of the support for visually based programs has been inferred from studies of visual prompts. For example, when instruction is facilitated with visual cues, individuals with ASD have been shown to acquire skills in a variety of areas, including cooking (Gines, Schweitzer, Queen-Autrey, & Carthon, 1990; Johnson & Cuvo, 1981; Martin, Rusch, James, Decker, & Trtol, 1982; Vaughn & Horner, 1995); daily living/self-care (Krantz, MacDuff, & McClannahan, 1993; Nietupski, Clancy, & Christiansen, 1984; Nietupski, Welch, & Wacker, 1983; Pierce & Schreibman, 1994; Thinesen & Bryan, 1981); homework/leisure (Frank, Wacker, Berg, & McMahon, 1985; MacDuff, Krantz, & McClannahan, 1993); vocational/educational (Martin, Elias-Burger, & Mithaug, 1987; Martin, Mithaug, & Frazier, 1992; Newman, Buffington, O'Grady, McDonald, Poulson, & Hemmes, 1995; Sowers, Rusch, Connis, & Cummings, 1980; Sowers, Verdi, Bourbeau, & Sheehan, 1985; Wilson, Schepis, & Mason-Main, 1987); and social interaction (Krantz & McClannahan, 1993, 1998). However, there remains much to be learned about the use of visual supports with individuals with ASD. In accordance with this need, the purpose of the current study was to analyze the effects of various combinations of visual supports, including visual schedules, subschedules, "finished" boxes, and timers, in facilitating transitions for two children with autism.

Method

Participants

Two students identified as having autism, Jeff, age 7, and Josh, age 5, participated in this study. Both boys had been diagnosed by licensed medical and other clinical professionals and met the criteria for Autistic Disorder specified in the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (*DSM-IV*; American Psychiatric Association, 1994). Informal observations and caregiver interviews indicated that each child exhibited problems with transitions between activities.

Experimental Design

Single-subject reversal designs (ABAB) were used to evaluate the effectiveness of visual supports in decreasing the amount of time spent transitioning the two children from one activity to another. This design allowed researchers to confirm the effects of the visual supports through the withdrawal and reinstatement of the intervention.

Baseline. The first and third phases were baseline conditions. During baseline, ongoing interventions were used, including (a) verbal prompts, (b) physical prompts, and (c) proximity control. A verbal prompt was defined as any caregiver-delivered verbal instruction that indicated an activity or redirected a participant (e.g., "time for pizza," "finished," or "time for work"). Physical prompts included caregiver assistance to complete an activity and to help a child transition to the next activity. None of the visual supports were in place during baseline conditions. Baseline 1 consisted of five sessions; Baseline 2 consisted of four.

Intervention. During the second and fourth phases, also referred to as the intervention phases, the visual supports were introduced to the participants. The first intervention phase consisted of ten sessions, and the final intervention phase consisted of four sessions.

Maximum Transition Time. Throughout the baseline and intervention phases, both participants were allowed 1 minute after a cue to transition (e.g., verbal prompt or line drawing of next activity) was given. If the child had not initiated movement toward the next activity within 1 minute, a verbal prompt was given. After an additional minute of noncompliance, another verbal prompt was given, paired with a picture of the next activity during the intervention phases. If the child had not moved to the next activity within 10 minutes of initially being cued, he was physically moved to the designated activity. Several transitions occurred during each session.

Data Collection

During all sessions, observers used frequency counts to score the number of prompts given by the caregiver and the number of removals from a setting. Latency data were collected using a stopwatch on the time latency between the caregiver's instruction and the child's movement toward a new activity. The stopwatch was started when the child was presented with the visual or verbal cue and stopped when the participant initiated movement toward the next activity.

Reliability. Interobserver reliability data were collected during 15% of the observations. Observer agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements multiplied by 100. An agreement occurred when all observers independently recorded the same duration of latency, within a range of 1 to 3 seconds, between the caregiver giving a visual or verbal cue and the participant initiating movement toward that activity. Aggregate interobserver reliability was 95%.

Participant 1: Jeff

Jeff was estimated to be functioning at a 32-month developmental age based on the Psychoeducational Profile–Revised (PEP-R; Schopler, Reichler, Bashford, Lansing, & Marcus, 1990), a developmental measure designed for students with autism and related developmental disorders. Jeff's communication consisted of delayed and immediate echolalia. He often repeated lines from familiar cartoons, such as "look at me, look at me, look at me now." One form of immediate echolalia that he commonly used was to repeat to himself a direction his teacher or caregiver had given him, such as "sit in the chair and you can have a piece of candy." Prior to this study, Jeff had had only minimal experience with visual schedules. According to various caregivers, Jeff had difficulty transitioning between community activity outings. Parents and other adults reported that it appeared to take Jeff a significant amount of time to comprehend when one activity was finished and another activity was about to begin. Jeff often refused to leave settings when he did not appear to anticipate which activity was next, and it was not uncommon for his caregiver to be required to physically remove him from settings.

Setting

This study was conducted during community activities for Jeff. His caregiver took him out to eat and to other activities in a large metropolitan area. These sessions occurred several times each week. Data were collected in community settings during these outings whenever a transition was necessary.

Materials: Visual Supports

Two visual supports were simultaneously introduced with Jeff. First, a schedule of daily activities, the *car schedule,* was attached to the caregiver's automobile dashboard. The schedule was constructed with long strips of foam core that had line drawings affixed with Velcro™, signifying the order of activities to take place that day. Second, a photo album measuring 5.5 by 6.5 inches, the *portable schedule,* was filled with line drawings identical to those found on the car schedule and depicted the same order of activities. The photo album was small enough for the caregiver to carry throughout the course of daily events.

Experimental Procedure

On arrival at Jeff's house, during intervention phases, the caregiver showed him the portable schedule and the icon of the first activity, along with a verbal cue, such as "time to go to the zoo." Once in the car, the caregiver pointed to the car schedule and gave the same verbal cue. At the conclusion of an activity, Jeff's caregiver displayed the portable schedule with the current activity, saying "finished," concurrently showing him the icon and verbalizing the nature of the next activity (e.g., "time for pizza"). This strategy was used to give Jeff a visual reminder of where he had been, where he was going, as well as the next activity on his schedule. In the car, the sequence was repeated. The completed activity's picture was identified and the caregiver told him "finished," and then described the next activity on the schedule. This routine was continued throughout each community session.

Results

Figure 1 shows the latency results for Jeff, presented across phases (ABAB). As shown, during baseline, the mean latency between the caregiver's verbal cues to begin a new activity and Jeff's initiation of movement toward the new activity was 6.2 minutes (372 seconds, range = 6–8 minutes). When the intervention was introduced for the first time (B), the mean response latency decreased to 1.8 minutes (108 seconds, range = 30 seconds–1 minute 10 seconds). Returning to baseline (A) resulted in an increased latency between activities, with a mean of 7.5 minutes (450 seconds, range = 6 minutes–8minutes). The final phase of this study, in which the intervention was reintroduced (B), resulted in a decrease of latency between activities to 1.6 minutes (96 seconds, range = 45 seconds–2 minutes 10 seconds).

Figure 2 displays the number of physical removals for Jeff and Josh. Jeff was moved with assistance from the current setting to the next setting on his schedule 14 times during baseline (A). During the first experimental condition (B), Jeff was moved 2 times. A return to baseline (A) resulted in 2 removals. During the final phase of the intervention, Jeff required no moves.

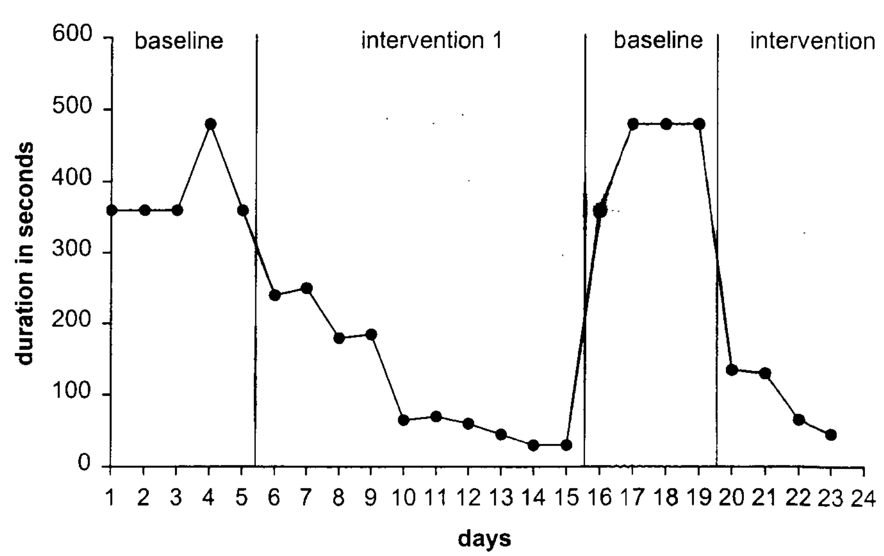

FIGURE 1. Baseline and intervention latency data for Participant 1, Jeff.

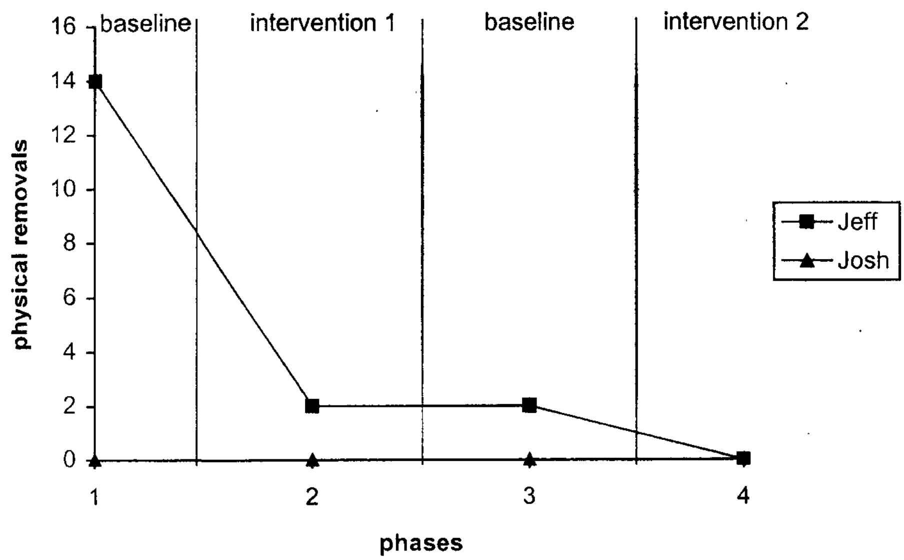

FIGURE 2. Physical removals.

Figure 3 presents the number of verbal and physical prompts for Jeff and Josh. Jeff was given 50 verbal or physical prompts during baseline (A). During the first experimental condition (B), Jeff received 41 verbal or physical prompts. A return to baseline (A) resulted in 56 verbal or physical prompts. During the final phase of intervention (B), Jeff was given 32 verbal or physical prompts.

Participant 2: Josh

The second participant in this study, Josh, attended an early childhood education program in a suburban elementary school. His class consisted of other children with developmental disorders as well as typically developing peers. Josh (age 5) was estimated to be at a developmental age of 50 months according to the Psychoeducational Profile–Revised (Schopler et al., 1990). Josh's speech consisted mostly of three- to five-word comprehensible utterances. He labeled and requested items in his environment, and he would state requests in complete sentences if asked to do so. For example, "pizza" could be expanded by Josh to be stated as "I want pizza please." However, Josh did not initiate spontaneous communication except for a couple of limited functions. Josh also displayed difficulty in transitioning between activities throughout his day. Transitions were most difficult when Josh was asked to cease favored activities. Josh often displayed self-stimulatory behaviors when given verbal transition cues, perhaps as a sign of anxiety. Josh had limited experience with visual strategies.

Setting

Josh participated in this study while engaging in an educational program conducted in his home. The program was a one-on-one approach designed to teach pre-academic readiness skills.

Materials: Visual Supports

Three visual techniques were simultaneously introduced with Josh. First, a *visual schedule* was made from a long strip of foam core. Line drawings of each of Josh's activities were affixed with Velcro™, indicating the order in which the activities were to take place that day. This was used during his daily home educational program and was easily transported from work areas to other locations in his home. Second, a *subschedule/finished box routine* was used. This technique was used during times when "work time" icons were on Josh's visual schedule. The subschedule portion of this technique was produced with 3 × 5 inch note cards with specific task instructions written on them. The finished box was constructed out of a coffee can covered with white paper displaying the word "finished." A slot large enough to fit the note cards was cut into the lid. Third, a Time Timer™ was placed in Josh's visual field while he engaged in favorite activities. This timer displayed a section of red indicating an allotted amount of time. The red section disappeared as the allotted time ran out.

Experimental Procedure

Throughout the intervention portions of the study (i.e., Phases 2 and 4), Josh's caregiver displayed his visual schedule, pointed to each icon, and told him what each depicted. After a quick review of the session's activities, she pointed to the first picture and said, "Time for work." During work time, the subschedule/finished box routine was implemented. At this time, the caregiver wrote specific work activities on 3 × 5 inch note cards while reading them aloud. Once a specific task was completed, Josh placed the corresponding note card in the finished box. When the tasks on all the note cards were completed, the caregiver pointed to the "work" picture and told Josh "finished," and "time for free time," while pointing to the "free time" icon on his visual schedule. Josh was then allowed to choose an activity for 10 minutes, as was the case during the baseline phase of the study. The caregiver placed the Time Timer™ within his visual field and set it for 10 minutes, drawing Josh's attention to the timer and stating, "when red is gone, computer is done," and so forth. After free time, Josh's caregiver returned his attention to the visual schedule, pointed to the "free time" icon, and said "finished." She then stated "time for work," as she pointed to the next picture on his schedule, and the routine was repeated.

Results

Figure 4 presents Josh's latency results. As shown, during baseline (A), Josh displayed considerable latency between the

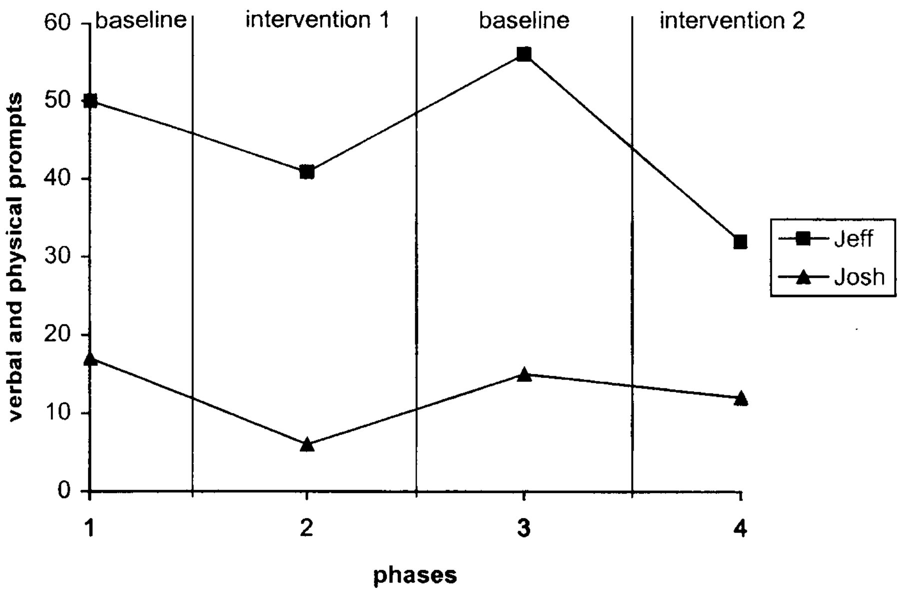

FIGURE 3. Verbal and physical prompts.

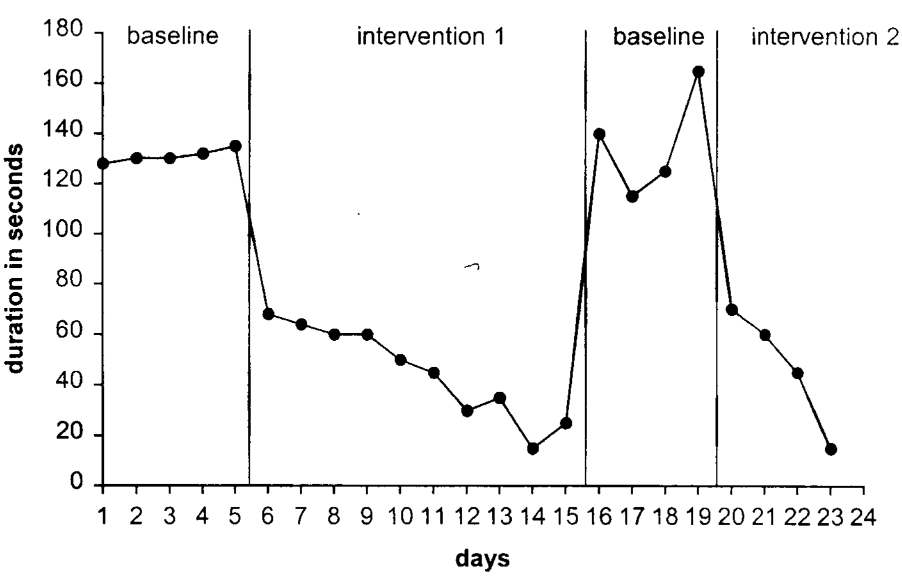

FIGURE 4. Baseline and intervention latency data for Participant 2, Josh.

caregiver's cue and his movement toward the next activity, with a mean of 2.5 minutes (150 seconds, range = 2 minutes 8 seconds–2 minutes 15 seconds). When the intervention was introduced for the first time (B), the mean decreased to 0.7 minutes (42 seconds, range = 15 seconds–1 minute 8 seconds). Returning to baseline (A) resulted in an increased latency between activities to a mean of 2.3 minutes (138 seconds, range = 1 minute 55 seconds–2 minutes 45 seconds). The final phase of this study (B), in which the experimental condition was reintroduced, decreased the mean latency to 0.7 minutes (42 seconds, range = 15 seconds–1 minute 10 seconds).

Figure 2 displays the number of physical removals for Jeff and Josh. Josh did not require physical assistance moving from one setting to the next on his schedule.

Figure 3 presents the number of verbal and physical prompts for Jeff and Josh. As shown, during the first phase of baseline (A), Josh was given 17 verbal or physical prompts. When the intervention was introduced for the first time (B), Josh received 6 verbal or physical prompts. A return to baseline (A) resulted in 15 verbal or physical prompts. During the final phase of this study (B), Josh required 12 verbal or physical prompts.

Discussion

Jeff was 7 years old at the time of this study and was displaying difficulty transitioning between activities while engaging in community trips. The time required for him to move from one activity to another was decreased during intervention. Jeff went from being physically moved from one activity to another the majority of the time to promptly responding when being shown the icon of where he was next to go. Before treatment, Jeff's communication consisted mostly of immediate and delayed echolalia. However, when using the visual schedule, he spontaneously spoke in full sentences to describe where in the community he was going that day, according to anecdotal reports. When the intervention was removed for the second baseline phase, Jeff scratched his caregiver and repeated the word "book" many times. These physically aggressive behaviors were uncharacteristic of Jeff. Once the visual supports were reintroduced, Jeff appeared to want to keep the visual schedule in sight and repeated "gimme the book" and "find the book" several times.

Josh was 5 years old at the time of this study and was also experiencing difficulty transitioning between home-based, educational activities. The intervention, consisting of a visual schedule, subschedules, a finished box, and a timer, significantly reduced the amount of time he spent transitioning between activities. When the intervention was first introduced, Josh responded positively to the materials. Specifically, during free time, Josh continually looked over his shoulder to determine how much time remained. When the red portion of the timer was almost gone, he would begin to engage in the activity at a faster pace (e.g., jumping more quickly on the trampoline) while looking and pointing at the timer. When the visual supports were removed for the second baseline phase, Josh appeared to want to use the intervention materials. The materials were within his sight on top of a cabinet, and Josh would reach for them, saying, "time to work, time to work." Apparently realizing that he was not tall enough to retrieve the materials, he took the caregiver's arm and pulled it toward the materials. When he did not receive the visual supports, he tantrummed. Subsequent to the completion of the study, Josh's mother reported implementing the strategies throughout the day as a result of observing his success with the visual techniques. This combination of visual cues appeared to effectively reduce the latency of time between activities as well as increase Josh's independence.

This study extends previous investigations on the positive effects that visually oriented interventions can have on students with autism. In spite of wide-scale use, only a minimal number of studies on the efficacy of visual strategies with children with autism have been published. This study broadens that database. Furthermore, this study is one of few that simultaneously implemented more than one visual technique during intervention. Based on these data and on other literature, educators and caregivers can use visual supports with reasonable confidence that they may be useful tools. Visual supports are easy to implement in many environments and are inexpensive. They are a basic tool that may have positive results with many children with autism. Nonetheless, further research is needed to assess the specific effectiveness of visual supports for a variety of individuals across settings and caregivers.

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