Hammill Institute on Disabilities

Focus on Autism and Other Developmental Disabilities
2014, Vol. 29(2) 95–110

DOI: 10.1177/1088357613517504
focus.sagepub.com
SAGE

Parent-Implemented Social-Pragmatic Communication Intervention: A Pilot Study

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Abstract

This pilot study investigated the feasibility and effectiveness of a home-based parent training and coaching program on the use of naturalistic and visual teaching strategies by parents of children (aged 2–5 years) with Down syndrome to promote and enhance these children's social-pragmatic communication skills. Five parent interventionist–child dyads participated. A single-case multiple-baseline design demonstrated the feasibility and effectiveness of the parent training and coaching program on parents' correct use of naturalistic and visual teaching strategies. Findings suggest that parents and children benefited from the intervention. Parents learned the new teaching strategies, implemented them with high fidelity, and were satisfied with intervention procedures and outcomes. In addition, parents reported improvement in their children's social-pragmatic communication skills. Implications for practice and future research are described.

Keywords

young children with Down syndrome, naturalistic teaching strategies, visual teaching strategies, parent interventionists

Many young children who have developmental disabilities (DD), including intellectual disability, Down syndrome, and autism spectrum disorders (ASD), exhibit speech-language impairments along with other deficits and delays inherent in their diagnosed disabilities. These speech-language impairments include deficits in social-pragmatic communication skills (Sigafoos, Arthur-Kelly, & Butterfield, 2006). Social-pragmatic communication skills include the use of communication behavior to carry out interactions in social environments (Levinson, 1983). Keen, Rodger, Doussin, and Braithwaite (2007) reported a shift in early intervention approaches from traditional behavioral (e.g., clinic-based intervention) to contemporary behavioral and social-pragmatic developmental approaches (e.g., intervention in the natural environment). Social-pragmatic approaches to communication development are relationship based, individualized, and grounded in developmental models (e.g., Prizant, Schuler, Wetherby, & Rydell, 1997; Schuler, Prizant, & Wetherby, 1997; Wetherby, Prizant, & Schuler, 1997). These developmental models are based on a social-interactionist perspective on language learning through meaningful communicative interactions (Bruner, 1975) and on a transactional model of social-communication development (McLean & Snyder-McLean, 1978; Sameroff & Chandler, 1975). The social-pragmatic approach focuses on enhancing social-communication skills through interactions in natural environments. Components of the social-pragmatic approach tend to emphasize (a) teaching spontaneous social communication within a flexible structure; (b) an initial focus on turn-taking and interactive exchanges; (c) child initiation; (d) concurrent consideration of gestural, graphic, and vocal communication modes; and (d) teaching new skills in the situation(s) in which they are expected to be used (Prizant & Wetherby, 1998).

An important component of current approaches to facilitating social-pragmatic communication and other developmental skills is teaching children in their natural environments (Dunlap, Ester, Langhans, & Fox, 2006). Natural environments and daily routines are preferred environments for intervention (Bruder, 2010; Kashinath, Woods, & Goldstein, 2006). Two types of promising teaching strategies in the natural environment are naturalistic and visual teaching strategies. Naturalistic teaching strategies include milieu teaching procedures, modeling, incidental teaching, mand-model, and time delay (Hart, 1985). Using these strategies, caregivers can build on children's interests in the natural environment while embedding teaching opportunities. Researchers have

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documented the effectiveness of naturalistic teaching strategies in promoting and enhancing communication skills of children with and without disabilities (e.g., Halle, 1982; Hart, 1985; Hart & Risley, 1975; Hemmeter & Kaiser, 1994; Ostrosky & Kaiser, 1991). In addition to naturalistic teaching strategies, existing literature suggests that visual supports can assist some children and adults with social situations and communication problems (Gray & Garand, 1993; Heflin & Simpson, 1998; Quill, 1995). Visual teaching strategies are those "visual cues that may prompt or remind children to engage in behavior or prepare them for another activity" (Odom et al., 2003, p. 171). Several researchers have reported effective use of visual supports during instruction for specific skills, such as communication and play skills (e.g., Arthur-Kelly, Sigafoos, Green, Mathisen, & Arthur-Kelly, 2009; Ganz & Flores, 2008, 2010). Combining naturalistic strategies and visual strategies may promote the social-pragmatic communication of young children with DD.

Hancock and Kaiser (2006) claimed that parents can be ideal language teachers who are likely to respond to their children's communicative attempts, are able to more closely monitor their children's communicative attempts because of their proximity to their children, and are able to model language that elaborates or expands on those attempts. The effectiveness of parent-implemented interventions for young children with disabilities has been reported by researchers (e.g., Kaiser, Hancock, & Nietfeld, 2000; Kaminski, Valle, Filene, & Boyle, 2008; Mobayed, Collins, Strangis, Schuster, & Hemmeter, 2000; Roberts & Kaiser, 2011; Schultz, Schmidt, & Stichter, 2011; Smith, Buch, & Gamby, 2000). As parents have been shown to positively influence their children's communication (Dunlap et al., 2006; Farrar, 1990; Hampson & Nelson, 1993; Kaiser et al., 2000; Kashinath et al., 2006), it follows that teaching parents naturalistic and visual teaching strategies to support their young children's social-pragmatic communication development may also be effective.

The purpose of this pilot study was to train and coach parents of young children with DD and very limited expressive language in the use of naturalistic and visual teaching strategies to promote and enhance their children's social-pragmatic communication skills. The research design allowed us to examine the feasibility and effectiveness of the parent training and coaching program on parents' correct use of naturalistic and visual teaching strategies. In addition, we interviewed parents regarding their children's social-pragmatic communication pre-intervention and post-intervention.

Method

This study was conducted as part of the Parent-Implemented Communication Strategies (PiCS) project, a 3-year development project funded by the Institute of Education Sciences. The project's research team included three university professors from a Department of Special Education, one of whom is a speech-language pathologist, and five graduate students from the Department of Special Education or Department of Communication Sciences and Disorders at a large Midwestern university.

Participants and Settings

We recruited participants for the study from three counties in the Midwest with populations ranging from 100,000 to 250,000 representing various socioeconomic levels and cultural, racial, and linguistic diversity. We recruited families through parent support groups, coordinators of county-wide early intervention programs, and other early intervention providers. Inclusion criteria were (a) families with young children (2–5 years old) who had been diagnosed with DD, including intellectual disabilities, ASD, Down syndrome, and other DD; (b) parents who expressed interest in providing intervention in their homes and were willing to participate in the completion of evaluation measures, which included videotaping, formal and informal assessments, and interviews; and (c) children with very limited expressive language and no more than 10 functional words or signs based on parents' report and formal assessments. Potential participant families met with the researchers and if they met eligibility criteria signed informed consent forms. All intervention and assessment sessions were conducted in the families' homes.

Parents. Twelve families with children with disabilities participated in the pilot study. Due to space limits, this report includes information on only five families who had children with the same diagnosis, Down syndrome. Each family was asked to identify one parent as the primary interventionist and that parent received training and coaching as he or she implemented the intervention with his or her participating child. Four mothers and one father were the primary interventionists in the study. Demographic information on the parent interventionists is provided in Table 1. Three of the interventionist parents were the biological parents of the target children and two parents were the adoptive parents of the target children.

Children. Demographic descriptions of the children who participated in the study are included in Table 2. Two boys and three girls ranging in age from 37 to 60 months at the beginning of the study participated. All participating children demonstrated significant delays and deficits in the communication domain based on parent report and the Preschool Language Scale–4th Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002).

Trainers/coaches. Demographic information on the trainers/coaches who worked with the parent interventionists is

Table 1. Parent Interventionists' Demographic Information.

Parent (child)	Parent	Age	Highest education	Ethnicity	Marital status	Family income ($K)
MK (KK)	Mother	45	Master's degree	White	Married	65–85
WM (JM)	Father	32	Associate degree	White	Married	65–85
AH (AH)	Mother	37	Master's degree	White	Married	86–100
KC (GC)	Mother	38	Bachelor's degree	White	Married	65–85
LM (HM)	Mother	48	High school	White	Married	26–45

Table 2. Child Participants' Demographic Information.

Child	Age at beginning of study (in months)	Gender	Ethnicity	PLS-4 total language pre-test SS (CA)	PLS-4 total language post-test[a] SS (CA)
KK	37	Female	Black	55 (21)	75 (26)
JM	48	Female	White	54 (21)	58 (30)
AH	48	Female	White	50 (20)	50 (26)
GC	38	Male	White	50 (11)	50 (9)
HM	60	Male	White	50 (19)	50 (24)

Note. PLS-4 = *Preschool Language Scale–Fourth Edition* (Zimmerman, Steiner, & Pond, 2002); SS = standard score; CA = chronological age in months.
[a]4.5 to 5.0 months between pre-test and post-test.

Table 3. Trainers'/Coaches' Demographic Information.

Trainer/coach	Parent(s) coached	Gender	Age	Highest degree
HK	MK	Female	39	PhD
JB	AH	Female	58	EdD
MD	AH, KC, LM	Male	33	MA
MM	KC	Female	22	BS
SB	WM	Female	39	MA

included in Table 3. Four females and one male (i.e., two faculty members and three graduate students), ranging in age from 22 to 58 years served as the trainers/coaches in the study. Prior to beginning the work with participant families, trainers/coaches participated in training sessions and received written materials on the target teaching strategies and on all research activities (e.g., working with families, collecting fidelity data, and developing visual supports in Boardmaker™ software).

Research Design

The primary research design and data analysis procedures we used in the study are derived from single-case or intra-subject research methodology (Kazdin, 2011). We used a within-subject multiple-baseline design across strategies to investigate the effectiveness of parent training and coaching on parental correct use of naturalistic and visual teaching strategies. Data on children's communication behavior were collected as secondary data only.

The experimental objective was to examine whether the independent variable (i.e., parent training and coaching on naturalistic and visual teaching strategies) would cause a change in the dependent variable (i.e., parents' correct use of teaching strategies) when, and only when, the independent variable was introduced. This pattern of data collection minimizes threats to internal validity (e.g., history, maturation, testing, and regression; Kazdin, 2011).

The study included 11 phases in the following order: (a) baseline, (b) naturalistic teaching strategies training, (c) probes, (d) environmental arrangement and modeling coaching, (e) mand-model coaching, (f) time delay coaching, (g) probes, (h) visual teaching strategies training, (i) probes, (j) visual teaching strategies coaching, and (k) maintenance probes.

Procedures

Baseline. During baseline sessions, the parent was asked to naturally interact with the child, for 15 min, with toys/materials they used during his or her natural interaction ("Interact with your child the way you normally would"). A member of the research team, who was not the coach for the family, videotaped the parent–child interactions. No discussion about the parent–child interaction occurred during the baseline phase.

Parent training. Each parent interventionist had one individualized, 45- to 60-min naturalistic teaching strategies training session in his or her home. The visual teaching strategies training sessions included one 45- to 60-min session with an overview of each of the visual strategies and one "hands-on" session in which the parent and trainer developed the individual visual supports the parent would use with her or his child. Children were not present during training sessions. The training materials for the parents included (a) a handout on each strategy with the definition and description of the strategy and a few examples, (b) a visual flowchart of the components/steps of each naturalistic strategy, and (c) examples of the various visual strategies. All individualized parent-friendly materials were organized in a binder that was given to each parent during the training session. During all training sessions (i.e., naturalistic and visual teaching strategies trainings), the trainer (a) provided information about social-communication interventions; (b) reviewed the handouts, flowcharts, and examples; (c) showed the parent an instructional DVD with examples of a parent using the strategies with her young daughter with Down syndrome; (d) collaborated with the parent to develop an action plan (i.e., how to use the strategies in the family's everyday routines); and (e) responded to parents' questions and concerns.

Naturalistic teaching strategies included (a) environmental arrangement, (b) modeling, (c) mand-model, and (d) time delay. Descriptions and examples for each strategy are provided in Table 4. Visual teaching strategies included (a) visual schedules, (b) visual rule reminder

Table 4. Descriptions and Examples of the Naturalistic Teaching Strategies.

Naturalistic teaching strategy	Description of strategy	
Environmental arrangement	The parent sets up the environment to increase the likelihood that the child will communicate.	
Joint attention on a desired object or activity		Parent responds to the child and reinforces communication behavior with praise and the desired object or activity.
Modeling	The parent demonstrates a word, phrase, sign, or gesture and expects the child to imitate the demonstration, for example, "More, please."	
Mand-model	The parent uses, in addition to the model, a verbal prompt in the form of a question (e.g., "What do you want?"), a choice (e.g., "Do you want an apple or a banana?"), or a mand (e.g., "Say 'more please'").	
Time delay	Within an established routine, the parent pauses to give the child an opportunity to initiate communication (e.g., The child finishes his rice milk). The parent holds up the container and looks expectantly at the child for 5 s.	

Table 5. Descriptions and Examples of the Visual Teaching Strategies.

Visual teaching strategy	Description of strategy	Example of visual strategies requested by parents in the PiCS project
Visual mini-schedule	A pictorial and verbal representation of regularly occurring sequential events	Morning routine (e.g., "Get dressed, Eat breakfast, Brush teeth, Play time")
Visual task analysis	A pictorial and verbal representation of an activity with sequential steps	Washing hands (e.g., "Turn water on, Wet hands, Get soap, Rub hands, Rinse hands, Turn water off, Dry hands")
Visual rule reminder cards	A pictorial and verbal representation of a rule that is commonly forgotten	"No feet on the kitchen table" and "Use nice hands"

Note. PiCS = Parent-Implemented Communication Strategies.

cards, and (c) visual task analysis. Descriptions of the visual teaching strategies are provided in Table 5.

Parent coaching. Parents were coached in their homes 2 to 3 times a week (detailed information about the coaching procedures can be found in Stoner, Meadan, & Angell, 2013). Each coaching session included a pre- and post-observation conference meeting between the parent and the coach. During the pre-observation conference, the parent and the coach reviewed a specific teaching strategy, based on the phase of the intervention, and collaborated on developing goals for the parent–child interaction (e.g., "What are the communication goals for your child today?" and "How will you use the teaching strategy in the natural interaction?"). Parents chose various activities and settings for the observation sessions; however, they were encouraged to engage their children in familiar activities. For example, some activities included playing games, having a snack, washing hands, or brushing teeth. Following the pre-observation conference, the parent interacted for 15 min with the target child while the coach observed. During the 15-min observation, the parent might change the activities or include several sequential activities such as washing hands before having a snack. The primary objective was not focused on the activity but on the parent's use of the strategy during these child-centered activities in the home environment. During the post-observation conference, the coach asked the parent to reflect on the session and provided feedback on the parent's use of the teaching strategies. On the days when no coaching was provided, the parents were asked to complete a self-report questionnaire in which they rated the frequency of their use of the teaching strategies and how confident they were about implementing them. When each parent reached the mastery performance criterion during the coaching phase on one strategy, coaching on the next strategy began.

During the coaching phase, the mastery performance criterion was reached when (a) the parent implemented the targeted teaching strategy at least 4 times at a team-defined Quality 3 level (e.g., Quality 3 level, the highest quality for modeling, was coded when the parent established joint attention with the child, presented a verbal prompt with or without a gestural prompt related to the child's interest, waited for child's response, and responded to the child's behavior) in three consecutive or nonconsecutive coaching sessions and (b) the parent indicated on the parent self-report form that she or he was confident using the strategy in the natural environment (when the coach was not available for consultation) and rated his or her implementation as

having been done "well" or "very well." We moved to the next phase only when the mastery performance criterion had been met. For more specific information on the coaching model used, see Stoner et al. (2013).

Probes and maintenance data. Probe data were collected after the naturalistic teaching strategies and the visual teaching strategies training sessions were conducted. Maintenance data were collected at the end of the coaching intervention. We are using the term *maintenance* to refer to data we collected after the coaching of a specific strategy ended and during the time coaching on a new strategy had begun. For example, once coaching on the modeling teaching strategy was completed, we coached the parent on the mand-model teaching strategy. The parents were videotaped, and we coded the modeling teaching strategy as maintenance data because the coaching on modeling was completed. Data were also collected after all coaching had stopped and we refer to these data as *post-intervention maintenance*. Similar to baseline sessions, during probe and maintenance sessions, the parent was asked to naturally interact with the child, for 15 min, using the toys/materials he or she usually used. Parent–child interactions were videotaped, but the researcher did not discuss the parent observation with the parent.

Data Collection

We used a variety of tools, including (a) the PLS-4 (Zimmerman et al., 2002; that is, formal assessment), (b) in-home observations, and (c) researcher-developed instruments (e.g., social validity survey) to assess the parents' use of the teaching strategies and the children's social-pragmatic communication skills. We videotaped parent–child interactions and observed and assessed both children's and parents' behaviors using our observation protocol.

Parents' and children's observational data. We videotaped each baseline assessment session, training session, coaching session, and probe and maintenance session using high-definition (HD) digital camcorders for data collection. We coded sequential 10 min of the video footage, chosen at random from the 15-min recording. To code each 10-min parent–child interaction, we used a coding manual that specifically detailed the parent and child behavior to be coded, regarding the (a) type of teaching strategy the parent used, (b) quality of the use of the teaching strategy, and (c) child's behavior (i.e., initiation or response). We selected an event recording measurement system to thoroughly capture and tally the broadest section of strategy use by parents and each communication behavior exhibited by children (Gast, 2010). This report focuses on the parents' use of the target teaching strategies and children's behavior. The children's communication function and communication topography will be addressed in other reports.

Fidelity of implementation data. We assessed fidelity of implementation of both the training and the coaching sessions at two levels: (a) The trainer/coach completed fidelity checks during each session and (b) another research team member completed fidelity checks following review of the recordings of the sessions. During each training and coaching session, the trainer/coach completed a checklist with all procedural steps of the training or coaching protocol (different forms were used to assess fidelity of implementation in the training and in the coaching sessions). To assess a second level of fidelity, a member of the research team who was not involved in the training and coaching reviewed the recording of all training sessions and 50% of the sessions of each coaching phase that were selected randomly. Trainers/coaches achieved high-fidelity levels for each phase and with each family, with 100% for all training sessions and a range of 96% to 100% for coaching sessions; only one session during the naturalistic coaching phase with the AH family had lower than 100% fidelity. Trainers/coaches received information about their level of fidelity of implementation and used it as feedback to adjust their training and coaching behaviors. We assessed fidelity of implementation of the strategies used by the parents by coding the quality of the strategies the parents used (i.e., parents' observational data).

Interobserver agreement. To assess interobserver agreement of the coded data, all observers were trained on the coding manual and coding system, and two research team members, one the primary observer and one the secondary observer, were assigned to each of the participant families. The paired observers coded a segment of a video, compared their codes (i.e., within ±2-s window time for each event), and continued this process until they achieved at least 80% reliability in each coding category. The paired observers met 3 to 4 times per week for 3 to 4 weeks before reaching high reliability rates. For each family, the primary observer independently coded all intervention sessions and the secondary observer independently coded 30% of the sessions (excluding sessions that were used to reach reliability), randomly chosen, in each phase. The overall interobserver agreement rate, calculated as agreements (i.e., coding the occurrence of a specific behavior at a specific time by both observers) divided by agreements plus disagreements, was 91.9%, with a range of 90.5% to 94.1%. Table 6 includes reliability data, average and range, for each variable by family.

Social validity data. The assessment of the social validity of our intervention included (a) a team-developed Likert-type scale questionnaire (i.e., pre-intervention, post-naturalistic teaching strategies coaching, and post-visual teaching strategies coaching) and (b) semi-structured interviews conducted by an external project evaluator after the naturalistic

Table 6. Reliability for Each Variable by Family.

Variable/parent	Naturalistic strategy (average, range)	Quality of strategy (average, range)	Visual strategy (average, range)	Child's behavior (average, range)	Overall
MK	95.7% (81%–100%)	94.4% (80%–100%)	99.7% (98%–100%)	95.9% (89%–100%)	94.1%
WM	94.3% (87%–99%)	89.1% (80%–100%)	100% (100%)	95.0% (87%–98%)	91.4%
AH	93.3% (73%–100%)	86.1% (79%–96%)	100% (98%–100%)	90.5% (82%–100%)	90.6%
KC	97.9% (85%–100%)	91.1% (74%–100%)	100% (100%)	93.5% (80%–100%)	93.0%
LM	96.4% (73%–100%)	86.9% (91%–100%)	99.7% (81%–100%)	91.0% (80%–97%)	90.5%
Overall	95.5%	89.5%	99.9%	93.2%	91.9%

teaching strategies coaching and after the visual teaching strategies coaching.

Data Analysis

Observational data. We video recorded 15 min of each session and randomly chose a 10-min segment of that video for coding (e.g., from the 3rd min of the video through the 12th min of the video). We coded the video segments in ProcoderDV™ (i.e., Procoder for Digital Video; Tapp, 2003), and these coded files were read by MOOSES™ (The Multiple Option Observation System for Experimental Studies; Tapp, Wehby, & Ellis, 1995) for data analysis. We exported data from MOOSES™ to Microsoft®Excel® software for statistical analysis and then to SigmaPlot® software for creating graphic representations of the performance data.

Social validity data. We calculated the average rating, across all parents, of the statements in the social validity questionnaire. In addition, two team members read the notes from the parent interviews and identified emergent common themes across all parents.

Results

Parents' Observational Behavior

Parents' use of the targeted teaching strategies is presented in Figures 1 through 5. The average duration of the intervention was 4 months. As described in the Method section, we used a single-case research design, specifically, within-subject multiple-baseline design across strategies and replicated across five families. Parents were not asked to use a set number of teaching strategies in each session and, therefore, the rate of teaching strategies (i.e., number of strategies used divided by number of minutes) used in each session varied among the parents. Consequently, because the rates of correct use of the teaching strategies by each parent are not related, we used the highest rate of correct use for each parent to create the scale for each graphic display of parent performance. Visual inspection of the graphs revealed an increase in the level of the mean of the rate of correct teaching strategies use during coaching on each one of the target strategies. Although the levels of correct teaching strategy use decreased for most strategies after the coaching phases ended, the levels of correct teaching strategy use were higher for most strategies during the maintenance phase compared with the baseline phase.

We found variability in the average rate of use of the different teaching strategies with high quality across parents for all strategies. The average use of the modeling teaching strategy increased or remained constant from baseline through training for all but one parent interventionist, WM, whose use rate decreased. During coaching, all parent interventionists increased their average use of the modeling teaching strategy. All parent interventionists decreased their average use of the modeling strategy during maintenance compared with the coaching phase. Parents used the mand-model teaching strategy most frequently both before and after the intervention. Across parent interventionists, two decreased their average use of the mand-model teaching strategy (WM and AH), one stayed the same (KC), and two parent interventionists, MK and LM, increased their average use of the mand-model teaching strategy following training. However, all but one parent interventionist, LM, increased their average use of the mand-model teaching strategy during coaching. The average use of the mand-model teaching strategy decreased during maintenance for all parent interventionists. None of the parent interventionists used the time delay teaching strategy during the baseline phase and, consequently, all increased their average use after training. During coaching, all parent interventionists increased their average use of the time delay teaching strategy. However, during the maintenance phase, all parent interventionists decreased their average use of the time delay teaching strategy.

The visual teaching strategy baseline data were collected prior to the development of the individual visual supports for each family. After training, the average use of visual supports increased for three parent interventionists. Two parent interventionists, KC and LM, did not use the visual teaching strategies after training. The average use of the visual teaching strategies during coaching was variable; one parent interventionist, MK, decreased her use between training and

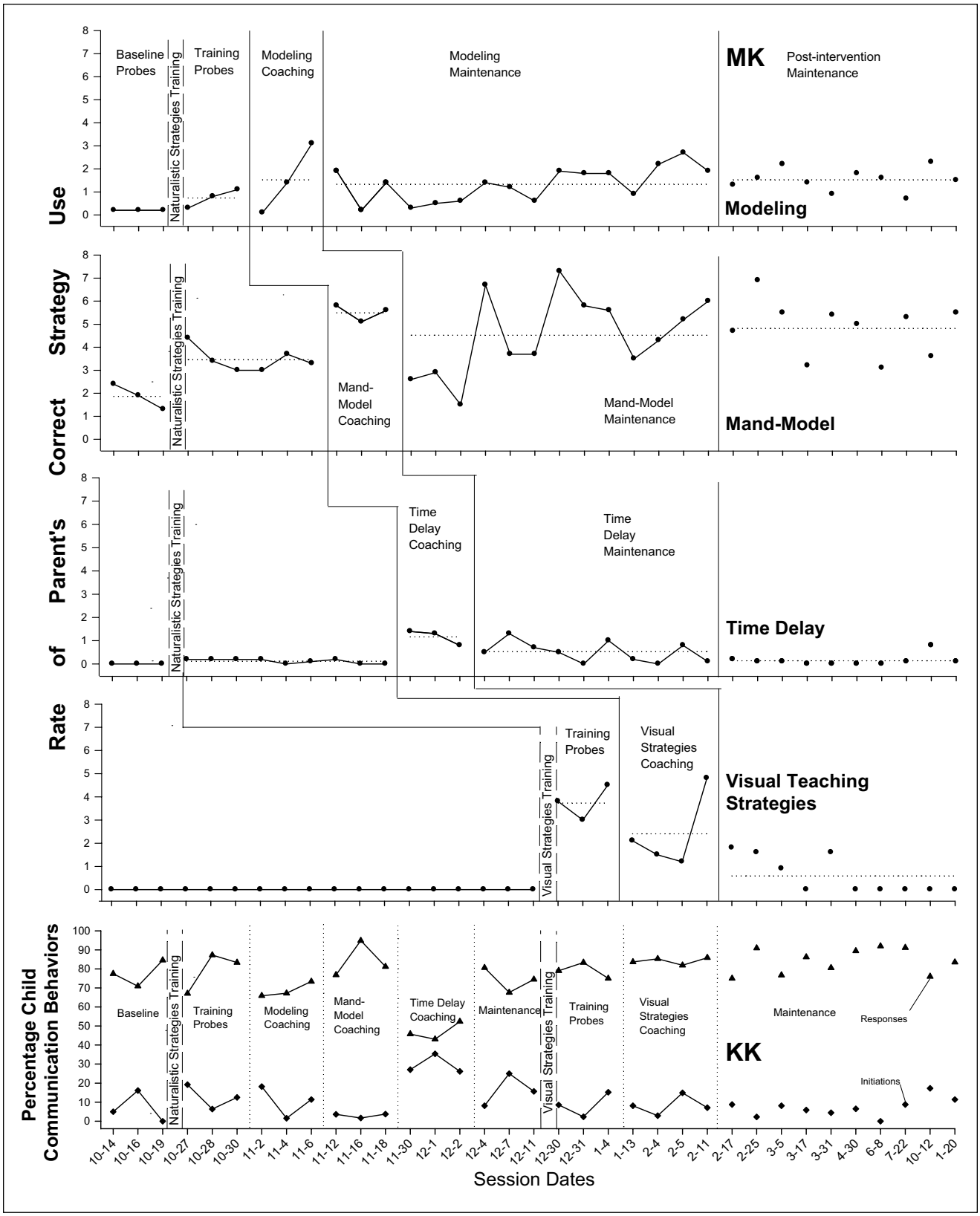

Figure 1. Rate of correct strategy use for MK and percentage of communication behaviors for KK.

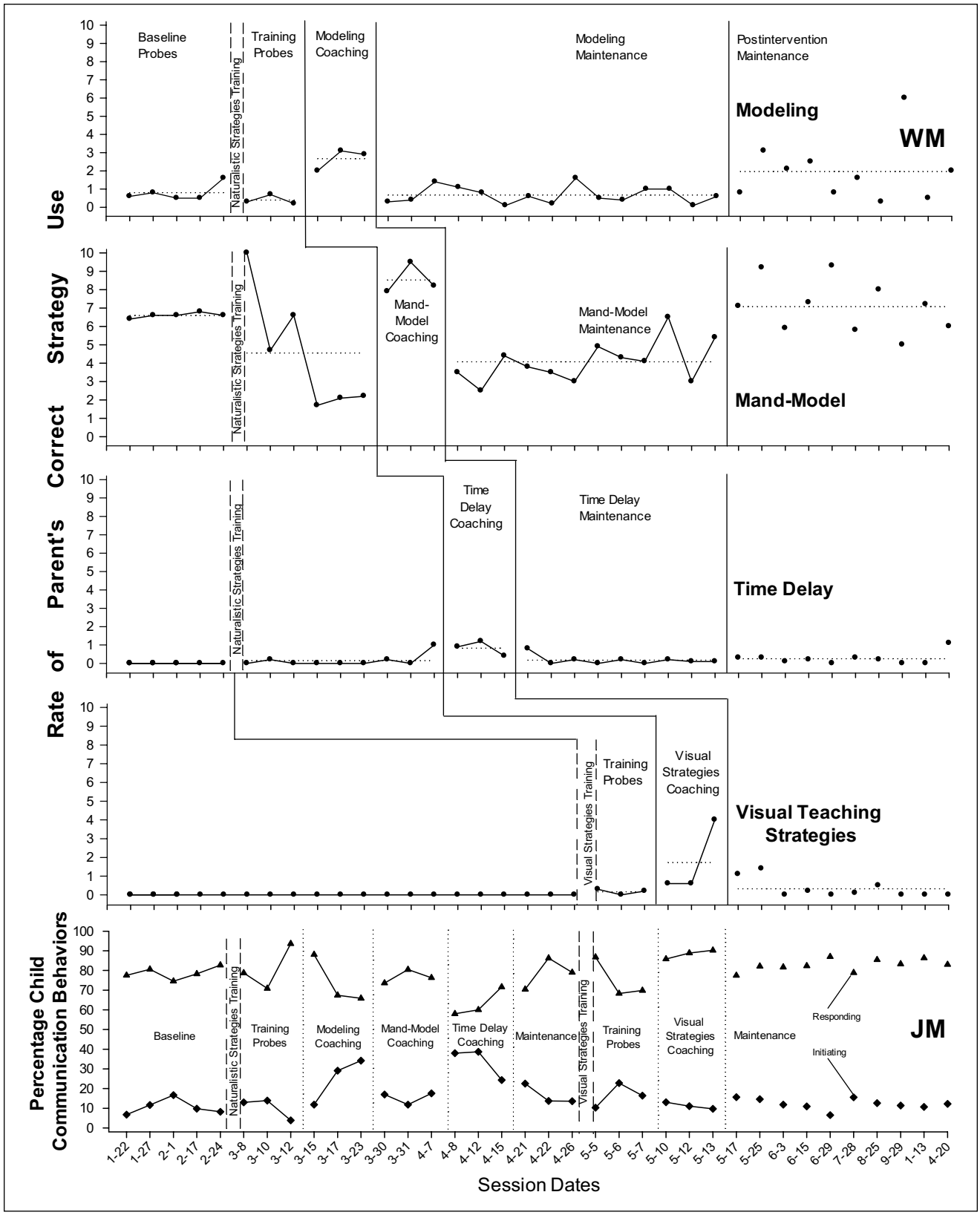

Figure 2. Rate of correct strategy use for WM and percentage of communication behaviors for JM.

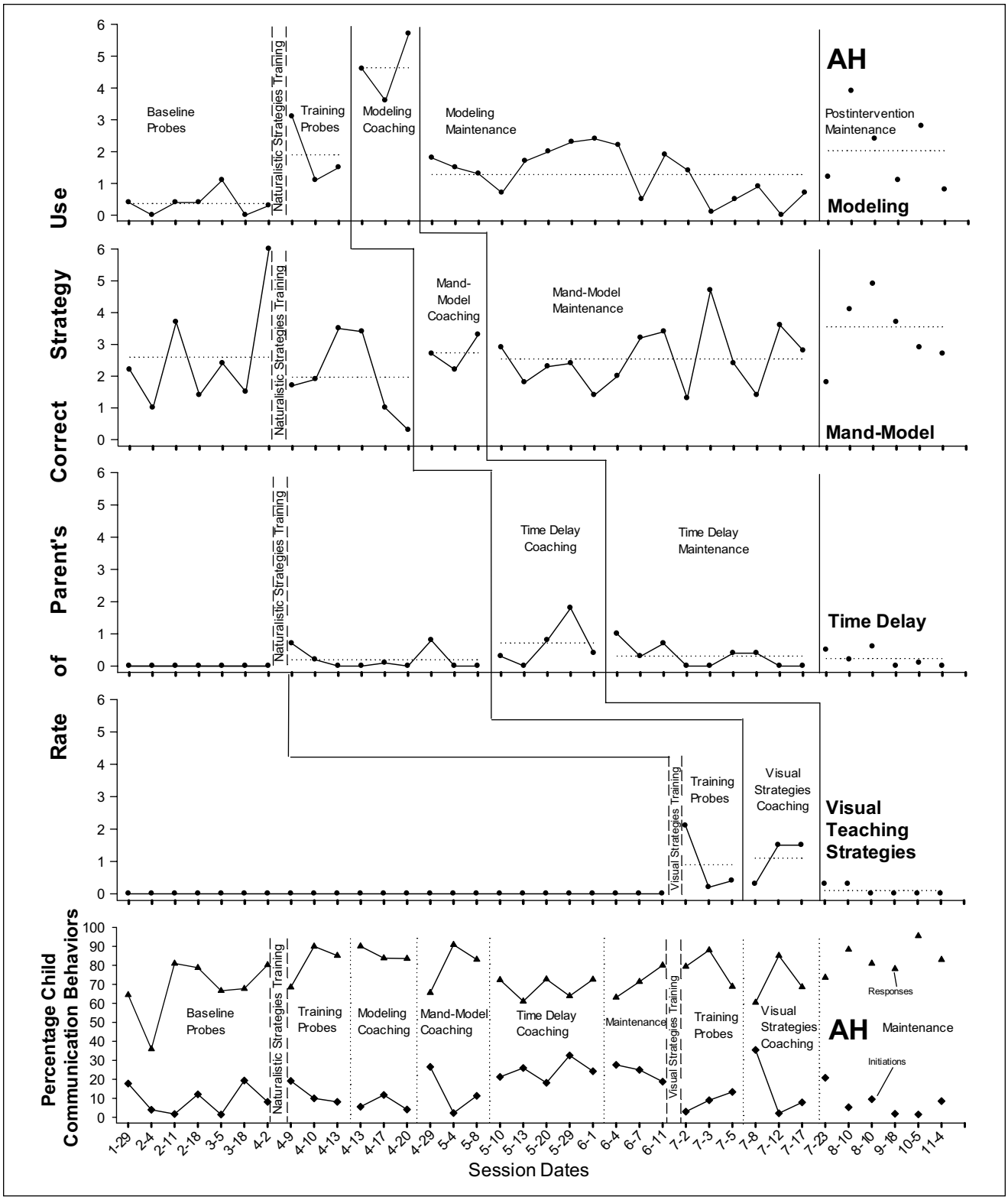

Figure 3. Rate of correct strategy use for AH and percentage of communication behaviors for AH.

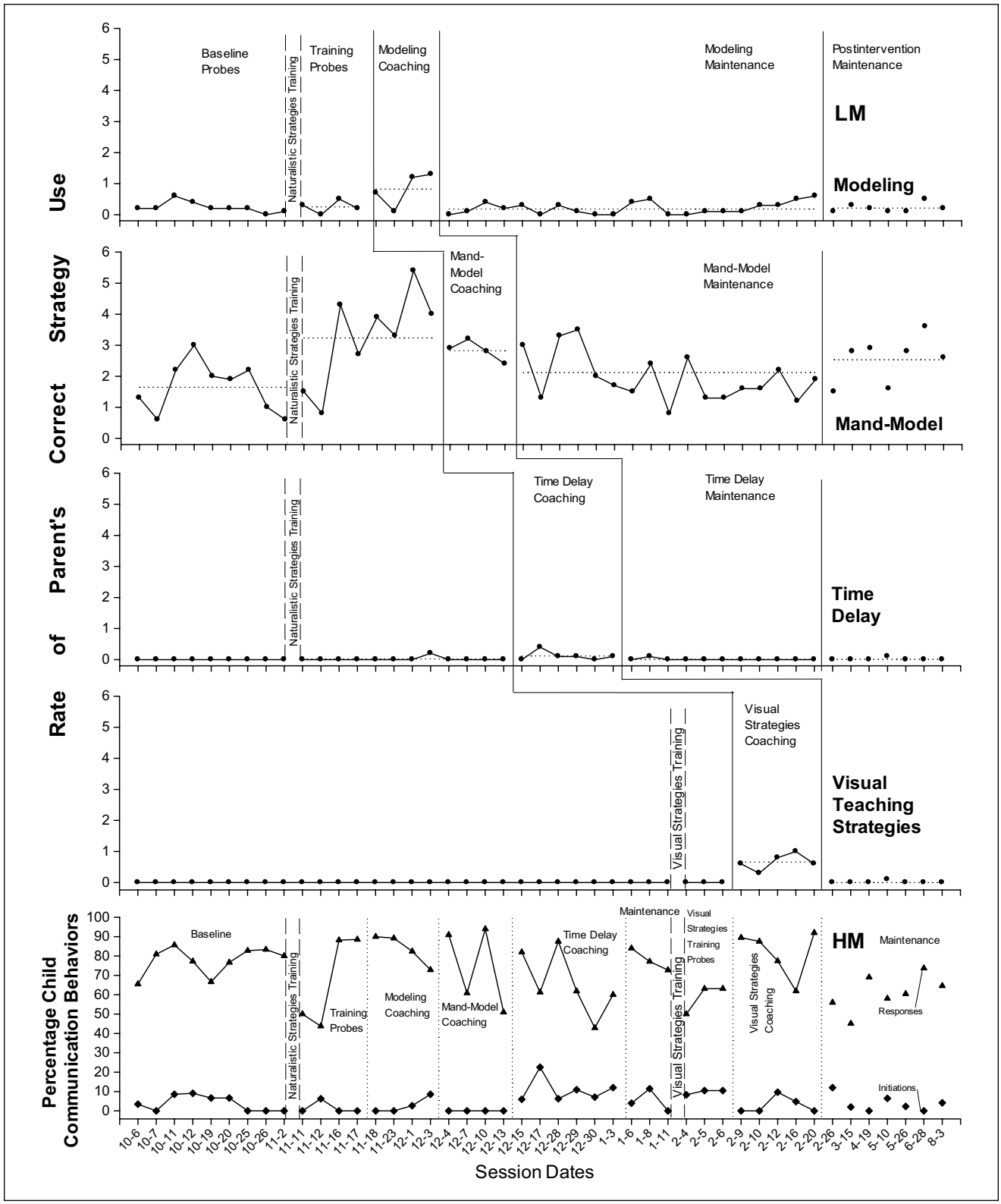

Figure 4. Rate of correct strategy use for LM and percentage of communication behaviors for HM.

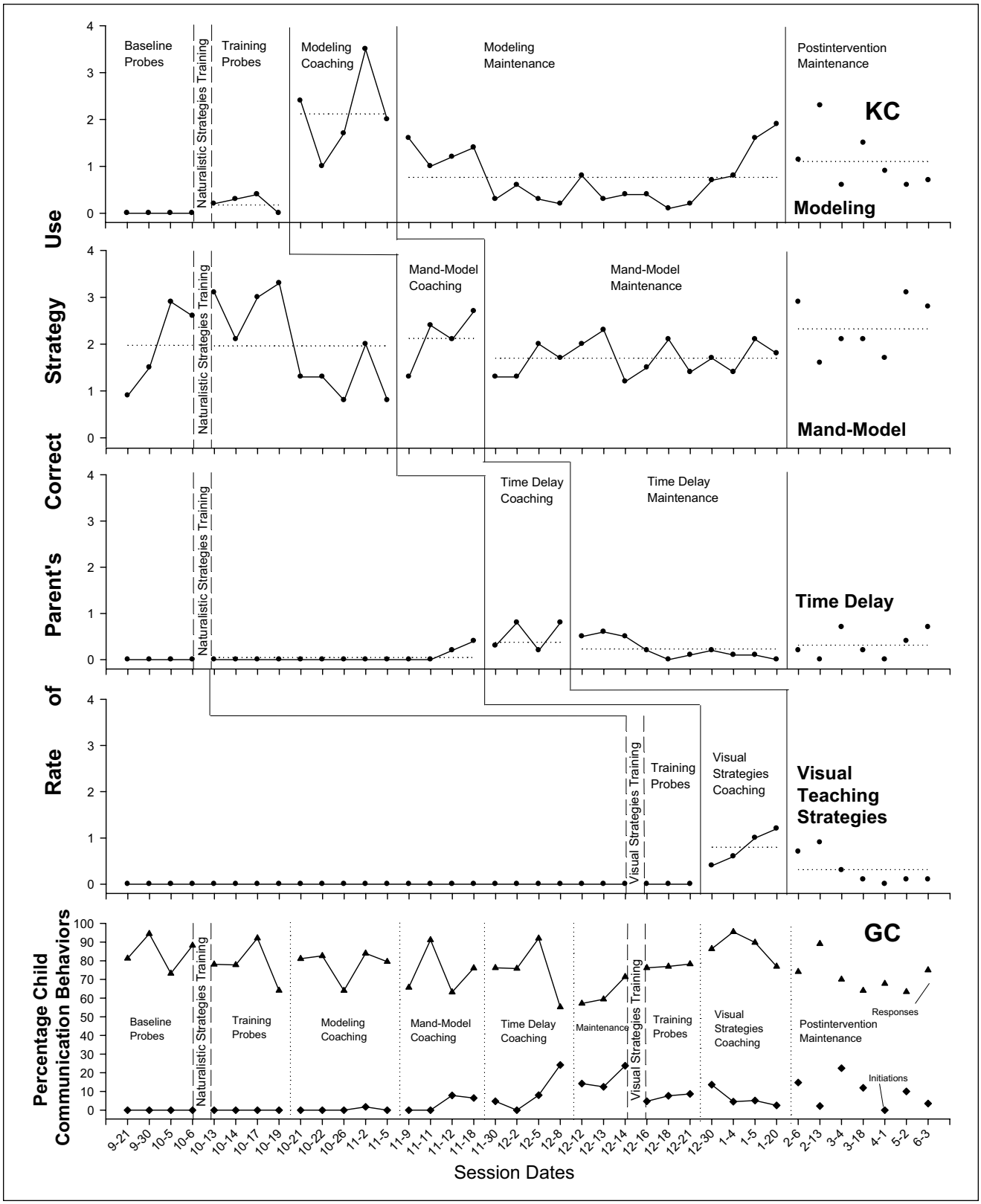

Figure 5. Rate of correct strategy use for KC and percentage of communication behaviors for GC.

coaching, and four parent interventionists increased their average use of visual teaching strategies during coaching. All parent interventionists decreased their use of visual teaching strategies between coaching and maintenance. However, it is important to note that there may not have been an opportunity to use the visual supports during observation sessions (e.g., there was no opportunity to use the bedtime routine strategy when coaching occurred during the day).

An increase in the average use of the teaching strategies with high quality between the baseline phase and the coaching phase was evident for all parent interventionists across all four strategies. All parents decreased their average use of the target strategies between the coaching and the maintenance phases.

Children's Observational Behavior

Children's behavior data (i.e., percentages of responding and initiating) within the single-case design are presented in Figures 1 to 5. All children responded to their parents' communication acts more frequently than they initiated communication acts across all phases. Although children's data are variable, one pattern emerged. During the time delay coaching phase, all children increased their mean percentage of initiation compared with the baseline phase.

Social Validity

Wolf (1978) referred to the validation of practices as "judgments of social validity" (p. 207). He suggested three levels of social validity: (a) the social significance and importance of the goals for society, (b) the acceptability of the strategies by consumers, and (c) the social importance of the outcomes. Average ratings of the parents' responses to the statements in the social validity questionnaire (i.e., post-naturalistic teaching strategies coaching and post-visual teaching strategies coaching) are presented in Table 7. Parents rated all statements with an average of 4 or higher on a 5-point Likert-type scale and they indicated satisfaction with the project's goals, procedures, and outcomes.

Analysis of the parent interviews revealed that the parent interventionists believed that the intervention/strategies supported them and led to improvements in their children's communication skills. In addition, they felt that the naturalistic teaching strategies were easy to implement and the visual teaching strategies were concrete. The strategies, along with the coaching support, were reported by parents as assisting them to intentionally foster their children's communication development.

Table 7. Average Ratings in the Parent Social Validity Questionnaires Across All Parent Interventionists.

Phase/questionnaire statement	Post-naturalistic teaching strategies coaching	Post-visual teaching strategies coaching
The information provided to you during training	4.5	4.5
The guidance provided to you during coaching	5.0	4.9
How satisfied you are with the overall project procedures	4.8	4.5
How easy it was to incorporate the strategies into your daily home routine	4.7	4.0
How useful the strategies were in meeting your child's goals	4.4	4.3
How satisfied you are with the overall project outcomes for your child	4.7	4.4
How satisfied you are with the overall project outcomes for you	4.7	4.7
Your knowledge of the teaching strategies	4.4	4.5
Your competence in implementing the teaching strategies	4.3	4.3
Your enjoyment in using the teaching strategies with your child	4.3	4.1

Note. 1 = *low/not useful/poor*; 5 = *high/very useful/excellent.*

Discussion

The purpose of this pilot study was to train and coach parents of young children with Down syndrome in the use of naturalistic and visual teaching strategies to promote and enhance their children's social-pragmatic communication skills. Overall, both parents and children seem to have benefited from the PiCS intervention. Parents learned new teaching strategies and were able to implement them with high fidelity. In addition, parents reported that their children improved their social-pragmatic communication skills and were satisfied with the intervention's goals, procedures, and outcomes.

Our findings support the findings of other researchers who reported that parents can learn new strategies and implement them in the natural environment (e.g., Alpert & Kaiser, 1992; Dunlap et al., 2006; Kaiser et al., 2000). All five parent interventionists reached mastery performance criteria and implemented the target strategies with fidelity and high quality during the coaching phases of the various teaching strategies interventions. The collaborative nature of the PiCS program is important to note because we feel that the trainer/coach–family working relationship was key to increasing parents' learning and implementation of the teaching strategies.

Similarly, this study's findings also support reports by other researchers that parent education/training programs are effective in producing positive outcomes for both

parents and children (e.g., Brookman-Frazee, 2004; Koegel, Bimbela, & Schreibman, 1996; Tonge et al., 2006). Brookman-Frazee (2004) suggested that collaborative partnerships between parents and professionals are associated with positive outcomes for both children and their families. We trained the parent interventionists in the use of the target strategies during the training phases, but it was the coaching phases that resulted in the parents' increased implementation of the teaching strategies. Our coaching sessions were collaborative in nature, afforded parents the opportunity to set individualized, child-specific intervention goals, and provided feedback to parent interventionists following each coaching session. We feel that, as Brookman-Frazee suggested, these supportive relationships enhanced the positive results of the project.

Schultz et al. (2011), who reviewed parent education programs, reported that in all reviewed studies, researchers did not report data on fidelity of implementation. In our study, we collected fidelity data on both researchers' implementation of the training and coaching phases and parent interventionists' implementation of the target strategies with high quality. The high fidelity of implementation for both the researchers and the parents strengthens our findings and supports the model of parent-implemented intervention for enhancing children's social-pragmatic communication skills.

Following training, a few parents increased their average use of the target strategies; however, we noticed a much larger increase during coaching sessions, and it seems that training alone was not enough to effect a large visible change in the parents' behaviors. This finding supports previous research that found that "one time" training alone is not enough for effecting behavior change (Kretlow, Wood, & Cooke, 2011). In addition to the knowledge and examples we provided during training sessions, the supportive individualized feedback we gave parents about their behaviors during natural routines in the coaching phases facilitated parent implementation of the teaching strategies.

Our findings demonstrate limited use of visual teaching strategies by the parents following intervention. The visual supports that we developed in collaboration with the parent interventionists were specific to the needs of the children and their families; for example, one parent developed a visual task analysis for washing hands and another parent developed a visual schedule for her child's bedtime routine. However, when we video recorded maintenance probes, we did not have many opportunities to observe the parents' use of the visual teaching strategies in the natural environment. For example, there may not have been opportunities to wash hands during our home visits and we rarely were at the parents' homes during the children's bedtime routines. Consequently, it is possible that the parents did use these strategies with higher frequency than was reflected in the data.

Although the parents' performance data are variable within each phase, there is a clear increase in mean rate of high-quality use of the target teaching strategies from the baseline phase through the coaching phase. All five parents used the mand-model strategy more frequently than they used the other strategies during the baseline phase. This might be expected because in everyday interactions, people seem to use more mands (i.e., questions, choices, or mands) than the other forms of communication strategies on which we focused in this study (i.e., modeling and time delay).

Interestingly, there was variability across families in the rate with which the parents used the target strategies after completion of the intervention phase. For some parents (e.g., AH) the post-intervention maintenance data (i.e., data collected after coaching on all strategies ended) reflect a higher rate of high-quality strategy use compared with the specific strategy maintenance data (i.e., data collected after the coaching on the specific strategy ended, but coaching on a different strategy was implemented). It is possible that during coaching phases, the parents were more focused on a specific strategy and, therefore, their maintenance data for other strategies decreased. When all coaching sessions ended, the parents used the strategies that worked best for their families. It is important to note that although our goal was to coach the parents to use the teaching strategies, we did not expect each family to use all strategies in all situations or to use all strategies with the same rate. Parents should have a wide repertoire of teaching strategies to use in various naturally occurring situations that facilitate the development of their children's social-pragmatic communication skills and, hopefully, the PiCS project provided that for our parent interventionists. We encouraged and continually suggested that our parent interventionists select the strategies that best fit their situations, goals, and family interaction styles. The PiCS project has demonstrated that parents can learn and implement with high-quality new naturalistic and visual teaching strategies to enhance and promote their children's social-pragmatic communication skills.

We found a connection between parents' use of the teaching strategies and the children's communication behaviors. When parents demonstrated high rates of high-quality modeling and mand-model strategies, most of the children increased their responding. When parents exhibited higher rates of high-quality time delay, the children showed higher frequencies of initiations. It is possible that when the parents reduced their use of mand-model and modeling strategies, children had more time to initiate and thus their initiations increased. This can be seen in all graphic displays representing time delay coaching sessions, as might be expected. However, during modeling coaching, WM decreased his rate of mand-model high-quality use from a mean rate of seven strategies per minute to around two strategies per minute. The child's spontaneous initiations increased from a mean of 8 to 24 in this phase. This is especially notable because WM did not increase his use of time delay but simply used mand-model and modeling less

frequently, giving the child more opportunity to initiate. This may also be a function of the parents' use of environmental arrangement, to provide children with reasons to communicate. Furthermore, we suspect the routines our parents instituted, encouraged by the PiCS coaching protocols, led children to understand the pragmatic nature of communication and empowered them to initiate communication more frequently.

Children's language skills were measured pre- and post-intervention (approximately 5 months between assessments) by the PLS-4. These data are secondary data and must be interpreted with caution. Results indicated that the standard score increased for two students and remained stable for three students. However, it is important to note that all students except GC increased their age-equivalency scores from pre- to post-intervention. GC's age-equivalency score decreased by 2 months, but all other participants increased their age-equivalency scores by at least 5 months. For children with disabilities, this rate of increase, which is expected of typically developing children, is encouraging.

As Kazdin (2011) and Wolf (1978) asserted, assessment of social validity could provide important information about the acceptability and importance of intervention programs. Assessment of social validity is especially important in the field of early intervention (Turan & Meadan, 2011) because socially valid intervention goals, procedures, and outcomes increase the likelihood parents will continue to use them. It is clear from the results of our social validity questionnaires and interviews that our PiCS parents were very satisfied with our naturalistic and visual teaching strategies interventions. In conclusion, the PiCS project seems to be a promising early intervention that could enhance parents' teaching strategies and their children's social-pragmatic communication skills.

Limitations and Implications

There are several limitations to this study and important implications for both research and practice. The primary goal of the PiCS project was to develop an intervention package (i.e., developmental project) and not to measure the effectiveness of the intervention in a large-scale study. The intervention presented in this article was conducted in three counties, in one state, with only five families and, therefore, generalization of the findings beyond these (or similar) families is limited. In addition, the diversity of the families who participated in the study was limited and only one father participated as a parent interventionist. Future research should replicate the current study and examine the effectiveness of the intervention in a large-scale study with more families who represent a wide range of diversity (e.g., family social economy status, parent interventionist gender, child's disability, and geographic location).

The effectiveness of the intervention should be interpreted with caution due to methodological limitations (e.g., same sequential implementation of teaching strategies, potential carryover effects). An additional limitation is the variability of the parents' data and limited number of sessions conducted in each phase. It is important to understand that although in some cases the trend decelerated or the data are quite variable from one day to another in the same phase, the parent still met our quality performance criterion and, therefore, the phase was ended. The fact that the parents used a specific strategy less frequently after the coaching phase does not necessarily mean they did not know how to use the strategy; it is possible that they did not think it was appropriate for a specific activity or situation. For example, parents reported that they found it "more difficult" to use time delay in their natural routines and, therefore, used it less frequently.

Another limitation of the study is the intensive external support (i.e., training and coaching in the home environment 3 times a week) provided to parents during the intervention. This type of intervention requires extensive resources and personnel and it might be difficult to implement the intervention in its present form with a large number of families. Future research might explore the use of technology (e.g., video conferencing technology) to conduct long-distance training and coaching sessions with participating parents. Long-distance coaching or combined face-to-face and long-distance coaching models could facilitate intervention with a larger number of diverse families, from a wider geographical region, while saving travel expense and time to and from the families' homes. We are currently piloting a long-distance model of training and coaching to address the cost/intensity limitation of the current model.

The findings of this study also have implications for practice. It is vital not only to train parents in strategies that can foster their children's communication development but also to collaborate with them, coach them until they feel confident and are competent with the strategy implementation, and to provide them with concrete and practical materials they can use in their everyday lives. Training and coaching sessions should emphasize specific strategies and include background information about the strategies as well as specific examples of how/when/where to use them. Our parent interventionists commented on the benefit of the instructional DVD we used during the training sessions. Parents specifically stated that observing a parent using the strategies with a child who had Down syndrome and limited expressive language, similar to their children, gave them tangible evidence and confidence that they could also implement the strategies with their children. The importance of identifying with another parent in a situation similar to one's own cannot be overstated.

The parents who participated in our study appreciated the one-on-one coaching we provided and both the observational data and parents' perspectives led us to the conclusion

that "one-time" training is not enough for changing parents' behaviors. Practitioners and professionals should consider providing planning and feedback sessions with the parents to enhance and promote the learning process.

We strongly believe that the collaborative nature of the PiCS project and the focus on family-centered intervention contributed to the success experienced by the parents and most of the children. However, collaboration is time-consuming especially when travel to and from parents' homes is involved. The relationships we established during our intense interaction with our parent interventionists may have facilitated our results. Although technology might ease the burden of time, it is unclear whether it would facilitate trainer/coach–family relationships. A model of intervention delivery that uses both face-to-face and technology formats could meet both the time needs of the professionals and the relationship needs of the families.

In conclusion, the PiCS intervention package provides a promising intervention for families with young children with disabilities who have limited expressive language. There are clear benefits for the parents and children who participated in this project. They gained practical, evidence-based instructional skills they could use in their natural home environments to enhance the social-pragmatic communication skills of their young children with DD. These parents saw tangible evidence of their learning and application of these skills in the concomitant gains their children made in their social-pragmatic communication skills.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was part of a federal grant project funded by the U.S. Department of Education, Institute of Education Sciences.

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