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**ANALYZING THE EFFECTS OF SELF RECORDING  
ON TEACHER USE OF INCIDENTAL TEACHING PROCEDURES  
TO TEACH LANGUAGE TO CHILDREN WITH AUTISM**

**by**

**SUSAN M. VENER**

**A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of  
the requirements for the degree of Doctor of Psychology, The City University of New  
York**

**2002**

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Psychology.

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## Abstract

ANALYZING THE EFFECTS OF SELF RECORDING  
ON TEACHER USE OF INCIDENTAL TEACHING PROCEDURES  
TO TEACH LANGUAGE TO CHILDREN WITH AUTISM

by

Susan M. Vener

Adviser: Professor Claire L. Poulson

Although incidental teaching has been shown to be effective in increasing aspects of language in children with autism, research is needed to identify procedures to increase staff use of incidental teaching. In the present study, following a pre-baseline training period during which teachers learned the basic skills of incidental teaching with children with autism, the number of teacher uses of incidental teaching was measured during regularly scheduled classroom activities. Following baseline, self recording was used to increase teacher use of incidental teaching to teach three children with autism to use target language forms. The children were 6-to-10 years of age. The language forms targeted were individually selected for each child, and they included use of prepositions, number adjectives, and size adjectives. Spontaneous use of the target language forms were recorded for two of the children. A multiple-baseline experimental design across three sets of classroom materials and environmental arrangements (i.e., conversation and snack, play activities, and academic or group activities) was used to evaluate the effect of self recording on the number of incidental teaching episodes completed by a teacher-child dyad. The study was replicated with two additional teacher-child dyads. The results showed that self recording produced a systematic increase in teacher use of incidental teaching of specific language forms. For one child for whom spontaneous use of number adjectives was recorded, a systematic increase in these descriptors occurred after the introduction of self recording. For the other child, although the introduction of self

recording did not immediately result in a systematic increase in spontaneous use of size adjectives, an increase in the targeted language did emerge over the course of the self-recording condition. These results (a) demonstrate that self recording is an effective strategy for increasing teacher use of incidental teaching in a classroom setting, and (b) provide additional evidence that incidental teaching is an effective strategy for increasing use of specific language forms by children with autism.

**Dedicated to my loving parents and to my wonderful husband for their unending encouragement and support throughout my graduate career.**

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**Analyzing the Effects of Self Recording on Teacher Use of  
Incidental Teaching Procedures to Teach Language  
to Children with Autism**

Incidental teaching procedures have been shown to be effective in teaching different aspects of language to preschool children from impoverished communities (Hart & Risley, 1968, 1974, 1975, and 1980), children with autism (MacDuff, Krantz, MacDuff & McClannahan, 1988; McGee, Almeida, Sulzer-Azaroff & Feldman, 1992; McGee, Krantz & McClannahan, 1985; McGee, Krantz & McClannahan, 1986; McGee, Morrier & Daly, 1999), children with severe language delay and moderately involved cerebral palsy (Cavallaro & Poulson, 1985), and adults with moderate to severe mental retardation (Farmer-Dougan, 1994). Incidental teaching involves: (a) the teacher arranging the environment to increase the likelihood that the child will make an initiation; (b) the child initiating toward an object; (c) the teacher requesting an elaborated response from the child; (d) the child producing an elaborated response; and (e) the teacher reinforcing the child's initiation by providing access to the requested object (MacDuff, Krantz, MacDuff, & McClannahan, 1988.)

Historically, the effects of incidental teaching on the language of children who were economically disadvantaged was demonstrated in a series of studies by Hart and Risley (1968, 1974, 1975, 1980). In 1968, Hart and Risley showed that incidental teaching resulted in systematic increases in child use of size and shape adjectives and in their use of spontaneous language. In 1974, the authors demonstrated that incidental teaching systematically increased child use of nouns, adjectives, and compound sentences when they initiated for play materials. In 1975, Hart and Risley showed that incidentally-trained language responses generalized to staff members other than those who directly taught them. Furthermore, in 1980, the authors demonstrated that incidental teaching resulted in more elaborate vocabularies and greater use of compound sentences.

Although Hart and Risley (1968, 1974, 1975, 1980) used incidental teaching procedures to teach aspects of language to children from economically disadvantaged communities, incidental teaching has also been effective in teaching language to children and youth with autism (MacDuff et al., 1988; McGee et al., 1985; McGee et al., 1986.) In 1985, McGee et al. showed that incidental teaching was effective in teaching children with autism to use prepositions to describe the locations of preferred toys and foods.

McGee et al. (1985) compared incidental teaching procedures to discrete-trial training procedures, and stated that with discrete-trial-training procedures, stimuli are selected by the teacher, and rewards are unrelated to the teaching stimuli. With incidental teaching, the teaching stimuli are selected by the child, and access to these stimuli is used as reinforcement.

The authors used discrete-trial and incidental teaching procedures to teach children with autism to use prepositions in a classroom setting, and assessed generalization from the classroom to a free-play setting. The results showed that incidental teaching produced more spontaneous use of prepositions, and promoted greater generalization of preposition use across settings, teachers, and stimulus positions. One might expect such findings because incidental teaching involves procedures recommended by Stokes and Baer (1977) to promote generalization, including: (a) "aiming for natural contingencies of reinforcement" (child language is followed by access to the very materials and activities for which the child initiated); (b) "loose teaching," (the teacher has little control over the particular stimulus for which the child initiates); (c) "using multiple exemplars" (as the child initiates for many different stimuli, different elaborations are requested); and (d) "using indiscriminable contingencies" (child initiations are not always followed by requests for elaborations).

Although incidental teaching has been shown to be effective in increasing aspects of language in children with autism, few published studies were found that focused on how to train staff to use incidental teaching procedures. One study, conducted by

MacDuff, Krantz, MacDuff, and McClannahan (1988), investigated the effectiveness of a set of procedures designed to increase staff use of incidental teaching procedures. The procedures included providing a written description of incidental teaching, written examples of incidental teaching episodes, worksheets that teachers used to write their own incidental teaching episodes, and a one-paragraph description of how a teacher could use visual attending and facial expression to prompt child initiations.

The results of the 1988 study showed that the training package was effective in increasing teacher use of incidental teaching across materials, settings, children, and group size. Teacher use of incidental teaching generalized from training settings to nontraining settings during which preferred objects were carefully arranged on a table to encourage child initiations. In the nontraining settings, the child was seated at the table, and was not actively engaged in other teaching activities. It is unclear whether similar treatment effects would have occurred in more naturalistic settings during which other adaptive skills were being trained concurrently, and during which there was a limited ability to control environmental conditions. Furthermore, although the authors did conduct eight generalization probes after training, it is unclear whether treatment effects would attenuate over a greater number of sessions.

A review of the staff-training literature supports the use of self recording as an effective training procedure that can be used to promote the maintenance of treatment gains over time and across settings (e.g., Bellack, Rozensky & Schwartz, 1974; Burg, Reid, & Lattimore, 1979; Burgio, Whitman, & Reid, 1983; Gajar, Scholss, Scholss, & Thompson, 1984; Kissel, Whitman, & Reid, 1983; Maletzky, 1974; Richman, Riordan, Reiss, & Pyles, 1988; Romanczyk, 1974). Self recording involves systematically attending to one's own behavior and responding to the occurrence of a specified target response. Self recording itself can be an effective intervention; that is, the process of observing and recording one's own behavior may produce a behavior change. The tendency for behavior to change as a function of self recording is known as reactivity

(Kirby, Fowler & Baer, 1991). Reactivity refers to the effect of the assessment procedure on subject performance (Kazdin, 1974).

Self-recording studies have shown that in those instances in which self recording has resulted in behavioral changes, the changes have been in the desired direction. If the subject perceives that a response is desirable or undesirable, that response will tend to increase or decrease accordingly (Kanfer, 1970; Kazdin, 1974; Maletzky; Cavior & Marabotto, 1976). For example, in an experiment conducted by Kazdin (1974), students were told either that: (a) "intelligent" students begin many sentences with "I" and "we" pronouns; (b) "less intelligent" students begin sentences with "I" and "we" statements; or (c) nothing about self-reference statements. The results showed that when students were told that self-reference statements were desirable, the number of self-reference statements increased, and when they were told that self-reference statements were undesirable, the number of self-reference statements decreased. For those students who were not given an indication of whether the use of pronouns was positive or negative, the number of self-reference statements increased only slightly. The desirability of the target response affected the direction of behavior change.

In addition to the desirability of the target response, additional parameters that might also contribute to the reactive effects of self recording include: (a) the feedback an individual receives from observing his or her own behavior (Kazdin, 1974); (b) the timing of self recording: that is, whether recording occurs prior to, during, or following a target response (Bellack, Rosensky & Schwartz, 1974; Cavior et al., 1976; Kanfer, 1970); (c) the obtrusiveness of the recording device (Kazdin, 1979; Kirby, Fowler & Baer, 1991; Nelson, Lipinski & Boykin, 1978); and (d) the performance standard to which an individual adheres. A subject who self records may show greater behavior change when working toward a specific level of performance rather than merely recording responses with no goal (Kazdin, 1974).

Although self recording itself can be an effective intervention procedure, data collected by self recorders may be inaccurate (Lee & Piersel, 1989; Nelson, Lipinski, & Black, 1975; Romanczyk, Kent, Diament & O'Leary, 1973; Simkins, 1971). Furthermore, Romanczyk et al. (1973) found that when self recorders were informed that the reliability of their recordings was being assessed, reliability measures substantially increased. Nelson et al. (1975), showed that when 20 college students self recorded face-touching responses, and were unaware that their behavior was being assessed, subject recording was less reliable than when subjects were aware of reliability assessment. It is interesting to note that desired behavioral changes occurred even when self recording was inaccurate.

The present study was conducted to determine the extent to which a self-recording procedure, preceded by a pre-baseline training package, could be used to promote teacher use of incidental teaching with children with autism. The pre-baseline training package included a written description of the components of incidental teaching and worksheets that provided teachers opportunities to write their own incidental teaching episodes. This study extends previous research by investigating the extent to which the treatment package would promote teacher use of incidental teaching in a special education classroom during which other adaptive skills were being trained concurrently. The present study further extends the literature by investigating whether teacher behavior change would maintain over a 12-month period.

## Method

### Participating Teachers

Three teachers employed at the New York Child Learning Institute participated in this study. The Institute uses an applied behavior analytic approach to educate children with autism, ages three to 21. Teachers Cathie, Beth, and Meg were 23 to 25 years old, had received bachelor degrees in psychology, and had been employed at the Institute for

10 to 13 months at the study's inception. No teacher had received formal training in incidental teaching prior to her participation in this study.

### Participating Children

Three children enrolled at the Institute, Steve, Max and Dara, participated in this study. Each child had received a diagnosis of autism from an outside agency prior to his or her enrollment.

Child 1, Steve, was a five-year-old boy whose language was characterized by pronoun reversal and limited conversational speech. Prior to the study, he had learned to use prepositions in response to the question, "Where is the (object)?"

Child 2, Max, was a five-year-old boy whose language was characterized by poor articulation, echolalia, and limited conversational speech. Prior to the study, Max had learned to use number adjectives in response to the question, "How many (items) do you want?," but he did not spontaneously use these adjectives when initiating for preferred objects.

Child 3, Dara, was a nine-year-old girl whose language repertoire was characterized by echolalia and limited spontaneous speech. At the study's inception, she had not learned to use size adjectives to request desired objects.

### Setting and Stimuli

Sessions were conducted in a classroom at the Institute. The classroom was occupied by six children, three of whom participated in the study, and four teachers, three of whom participated. The setting included: (a) five teaching stations, each consisting of one or two desks and two-to-four chairs; (b) one computer station; (c) one TV area; (d) nine shelves for educational curriculum; (e) two shelves for toys, games, books, puzzles, trains, train tracks, and cars; (f) an air conditioner; (g) a phone; and (h) a CD player.

For Teacher 1 and Child 1, experimental sessions were 15 minutes in length and were conducted daily during regularly scheduled conversation and snack activities, play activities, and academic activities. During conversation and snack, the child consumed a

snack, while seated at a table across from the teacher. Throughout the snack activity, the child was taught to initiate conversations about topics of interest, using scripts and script-fading procedures. During play activities, Child 1 completed a puzzle, played with trains, read a book, and completed a maze worksheet. During academic activities, he engaged in reading and handwriting tasks, and copying a picture provided as a model.

For Teacher 2 and Child 2, experimental sessions were 10 minutes in length, and were conducted during (a) conversation and snack, (b) play activities, and (c) group activities, during which Child 2 participated in games of musical chairs, hot potato, marching band, relay races, and story time.

For Teacher 3 and Child 3, experimental sessions were 10 minutes in length, and were conducted during (a) conversation and snack, (b) play activities, and (c) academic activities.

Throughout each set of classroom activities, each teacher worked alone with the target child, with the exception of: (a) Teacher 1 with Child 1 during play activities; (b) Teacher 2 with Child 2 during group activities; and (3) Teacher 3 with Child 3 during play activities. During these activities, the teacher not only worked with the target child, but simultaneously worked with one or two additional children.

### Response Definitions for Incidental Teaching

**Initiation.** An initiation included reaching for an object, pointing to an object, gesturing toward an object, asking questions about an object, and/or verbally requesting an object. Initiations were not verbally, gesturally, or manually prompted. This definition was consistent with that used by MacDuff et al. (1988).

**Incidental Teaching Episode.** An incidental teaching episode was scored when each of the following components was completed following a child initiation: (a) the teacher requested a verbal elaboration from the child; (b) the child emitted a correct verbal elaboration; and (c) the teacher provided access to the requested object. This

definition was similar to the definition used by Hart and Risley (1982) and MacDuff et al. (1988).

A teacher request for a verbal elaboration from the child included: modeling a complete sentence (e.g., "Say, 'Can I have the big cookie?' "); modeling a partial sentence (e.g., "Say, 'Can I...' "); requesting a terminal behavior (e.g., "What size cookie do you want?"); leaning toward the child; using an "expectant" facial expression; requesting better articulation; asking for more appropriate volume; or targeting more appropriate sentence structure.

A correct verbal response was scored when the child used the language form requested by the teacher. For example, Child 1 used a preposition in response to the question, "Where is your snack?"; Child 2 used a number adjective when asked, "How many trains are you taking?"; and Child 3 used a size adjective in response to the question "What size chip do you want?"

Providing access to the requested object was scored if the teacher gave the requested object to the child after the more elaborate verbal response. The teacher confirmed that the response was correct (e.g., "Terrific, you said 'Can I have the big cookie?' ") and quickly provided the object for which the child initiated.

#### Response Definitions for Child Dependent Variables

In addition to collecting data on teacher use of incidental teaching, data were collected on the spontaneous use of number adjectives for Child 2, and the spontaneous use of size adjectives for Child 3. I was unable to collect reliable data on the performance of Child 1.

Spontaneous Use of a Number Adjective. Spontaneous use of a number adjective was scored when Child 2 used a number adjective to initiate a request that did not follow a teacher request for a verbal elaboration (e.g., "I want two trains;" "I want three more;" "I'll take a few chips.")

**Spontaneous Use of a Size Adjective** Spontaneous use of a size adjective was scored when Child 3 used a size adjective to initiate a statement (e.g., "Can I have the big chip?"; "That's really big.") Statements that followed a teacher request for a verbal elaboration were not scored as spontaneous.

**Prompted Use of a Size Adjective.** For Child 3, prompted use of a size adjective was scored when the child provided a correct response following a teacher's verbal request for an elaboration (e.g., "Is this a big or little (object)?", "Is this a little or big (object)?", "Do you want a big or little (object)?", "Do you want a little or big (object)?", or "What size (object) do you want?") A prompted response was not scored when the child did not respond to the teacher's question, the child responded incorrectly, or the teacher modeled the correct response (e.g., "Say, I want the little chips.")

### **Experimental Design**

Each teacher/child dyad constituted a separate experiment. In each experiment, a multiple-baseline experimental design was conducted across three sets of regularly scheduled classroom activities. This design was used to evaluate the effects of self recording on the number of incidental teaching episodes that targeted specific language forms.

### **Observation System**

Data were collected on the following responses: (a) number of incidental teaching episodes targeting use of prepositions by Child 1, use of number adjectives by Child 2, and use of size adjectives by Child 3; (b) number of spontaneous uses of number adjectives by Child 2; (c) number of spontaneous uses of size adjectives by Child 3; (d) number of prompted uses of size adjectives by Child 3; and (e) accuracy of teacher self recording.

### **General Experimental Conditions**

Prior to the study, each teacher agreed to participate, and signed a consent form. The consent form specified that her participation in the study was optional, and that her

decision about whether to participate would not affect her continued employment at the Institute.

### Pre-Baseline Training

Before baseline, each teacher participated in five 30-minute training sessions. The training closely conformed to the MacDuff et al. (1988) training procedures. Training sessions were conducted by a senior-staff member of the New York Child Learning Institute. During the first training session, the trainer gave each teacher a written description of the components of incidental teaching. The written description of the components is presented in Table 1.

Throughout the five pre-baseline training sessions, each teacher was presented with written examples of incidental teaching episodes that involved preposition use for Teacher 1 with Child 1, number adjectives for Teacher 2 with Child 2, and size adjectives for Teacher 3 with Child 3. Each teacher was provided opportunities to write examples of incidental teaching episodes that pertained to her child. In training sessions 1 through 4, each teacher was given 6, 5, 4, and 3 written examples of incidental teaching, and was instructed to write 2, 3, 4, and 5 examples of her own. On training session 5, each teacher was presented with 3 examples of child initiations that did not result in incidental teaching because of inappropriate child behavior. The teacher was instructed to write one example of an initiation that would not result in incidental teaching and five examples of completed incidental teaching episodes. A summary of the activities during each of the five training sessions is presented in Table 2.

The written examples of incidental teaching episodes presented to Teacher 1 involved child use of prepositions. For example, the first written example involved the child reaching for a train. The teacher placed her hand over the child's hand, prevented him from obtaining the toy, and asked, "Where is the train?" The child did not respond to the teacher's question, so the teacher prompted the response, "Say, on the tracks." The child responded to this prompt, and access to the train was provided. All of the written

examples of incidental teaching presented to Teacher 1, Teacher 2, and Teacher 3 are presented in Appendixes A, B, and C respectively (see Appendixes A, B, and C).

At the completion of each pre-baseline session, the written examples were scored by two independent observers. For Teacher 1, 75% were scored as correct, for Teacher 2, 90%, and for Teacher 3, 85% were scored as correct.

### Baseline

Following the completion of the pre-baseline training sessions, data were obtained on teacher and child performance during the three regularly scheduled sets of classroom activities (conversation and snack activities, play activities, and academic or group activities). Feedback was not provided to the teacher regarding her use of incidental teaching.

### Self Recording

For Dyad 1, after the number of incidental teaching episodes stabilized across the three sets of activities during baseline, Teacher 1 was given a data sheet and was instructed to self record the number of incidental teaching episodes that targeted child use of prepositions during conversation and snack activities. The senior-staff member at the Institute instructed the teacher (a) to record each episode of incidental teaching immediately following its occurrence using a pencil, and (b) to record the cumulative number of episodes completed at the end of each session using a yellow marker, thus creating a bar graph across consecutive days. The instructions provided to each teacher prior to beginning self recording are presented in Table 3.

After the number of incidental teaching episodes during conversation and snack increased and stabilized, Teacher 1 was instructed to self record the number of incidental teaching episodes completed during play activities. After the number of episodes again increased and stabilized, Teacher 1 was instructed to self record the number of incidental teaching episodes completed during academic activities. The gradual expansion of the self-recording requirement allowed assessment of the effect of self recording on each set

of activities sequentially. Self recording was introduced into each set of activities in the same order for Teacher 2 and Teacher 3.

#### Additional Instructions to Self Record for Teacher 1

During the self-recording condition, in sessions 23, 46, and 102, Teacher 1 did not self record. Following a session during which self recording did not occur, the trainer reminded the teacher to (a) use a pencil to record each incidental teaching episode, (b) use the marker to record the total number of episodes completed, and (c) when zero episodes of incidental teaching occurred, record the date on the data sheet and leave the column blank. The additional instructions provided by the trainer to the teacher to self record are presented in Table 4.

#### Additional Incidental Teaching Training for Teacher 2

During the self-recording condition, when Child 2 began to spontaneously use number adjectives, Teacher 2 stopped using incidental teaching. It was determined that Teacher 2 required additional training on how to further expand on child spontaneous language. Following sessions 24 and 53, the trainer presented the teacher with five examples of ways to request elaborations. For example, if Child 2 initiated for a desired object using a number adjective (e.g., "Can I have three blocks?"), the teacher might request an elaboration using an additional descriptive adjective (e.g., "Say, 'Can I have three of the little blocks?' ") The teacher was asked to generate five additional examples of incidental teaching. The additional training provided to Teacher 2 is presented in Table 5.

#### Interobserver Agreement

Incidental Teaching Episodes Two independent observers simultaneously collected data on both teacher and child performance. The primary observer sat at a table approximately 10 feet from the teacher. The second observer sat at a table on the other side of the teacher, at a distance of approximately 10 feet. Both observers collected data on other teaching activities while at the same time collecting data on the target responses.

By engaging in multiple data collection activities, it was difficult for each observer to determine what the other was recording.

Interobserver agreement was calculated using the formula: total number of agreements divided by total number of agreements plus disagreements X 100. An agreement was scored when the two independent observers agreed that the episode included: (a) a child initiation; (b) a teacher request for a verbal elaboration from the child; (c) a child correct elaboration; and (d) the teacher providing access to the requested object. A disagreement was scored when one observer scored any of the above components as having occurred, while the other observer did not. This procedure was used to calculate (a) written examples during pre-baseline training, and (b) in-vivo episodes during baseline and self-recording condition. Interobserver agreement data on the occurrence and nonoccurrence of the target responses are reported in the following section. Although agreement data were calculated separately for occurrences only, the data were very similar to those reported below for occurrence and nonoccurrence measures, and are therefore not presented.

#### Interobserver Agreement Results

##### Written Incidental Teaching Examples During Pre-Baseline Training

Interobserver agreement on the correctness of the written incidental teaching examples was assessed for 100% of the teacher examples. The observers achieved 90%, 95%, and 80% agreement for Teacher 1, 2 and 3 respectively.

Incidental Teaching Episodes During Baseline and Self Recording Interobserver agreement was obtained for at least 25% of experimental sessions for each teacher-child dyad during baseline and self recording. Agreement was obtained on: (a) the number of incidental teaching episodes targeting use of prepositions for Child 1; (b) the number of incidental teaching episodes targeting use of number adjectives for Child 2; and (c) the number of episodes targeting use of size adjectives for Child 3 (see Table 6.)

Table 6 shows, that for each teacher, during baseline and self recording, and across each of the three sets of classroom activities, mean interobserver agreement was 88% or higher. The table further shows that for each teacher, during self recording, agreement on the number of incidental teaching episodes completed had a range of 50-100%. Fifty percent agreement was obtained during sessions when only two incidental teaching episodes were recorded, and one observer observed both episodes, and the other did not.

Interobserver agreement also was obtained on: (a) the number of spontaneous uses of number adjectives for Child 2; (b) the number of spontaneous uses of size adjectives for Child 3; and (c) the number of prompted uses of size adjectives for Child 3. The agreement data obtained are presented in table 7.

The table shows that for Child 2 during baseline and self recording and across all three sets of classroom activities, mean interobserver agreement on spontaneous use of number adjectives was 86% or more. During self recording, during conversation and snack, the agreement had a range of 50 -100%. During play activities, agreement had a range of 60 -100%. Low agreement scores were again obtained when few episodes of spontaneous language were observed.

For Child 3, Table 7 shows that during baseline, and across all three sets of classroom activities, the mean interobserver agreement obtained on child spontaneous use of size adjectives was 100%. During self recording, the means obtained were 96%, 72%, and 80% across the three sets of activities respectively. The interobserver agreement obtained during self recording had a range of 0 - 50% during conversation and snack activities, and 0 - 100% during both play and academic activities. The reasons for the lower agreement scores are the same as those provided above.

The last section of the table shows that for Child 3, during baseline, across all three sets of the classroom activities, the mean interobserver agreement obtained on child prompted use of size adjectives was 100%. During self recording, the means obtained

were 93% during conversation and snack, and 100% during both play and academic activities. The interobserver agreement obtained during self recording had a range of 50 - 100% during conversation and snack.

## Results

### Teacher 1/Child 1

Teacher 1 Data were obtained during conversation and snack, play, and academic activities, as shown in Figure 1. Figure 1 shows the number of incidental teaching episodes completed by Teacher 1 with Child 1 that targeted his use of prepositions across three activities during baseline and self recording. Teacher responding was measured over an entire 12-month period.

The data show that during baseline, during conversation and snack, play and academic activities, the number of incidental teaching episodes had a range from 0 to 1. During conversation and snack activities, as shown on the top graph of Figure 1, within the first 5 sessions of self recording, there was an increase over baseline to a high of 5 episodes. During the last 20 sessions, number of incidental teaching episodes had a range from 2 to 5 per session.

During play activities, within the first 3 sessions of self recording, there was an increase in the number of episodes from 0 during baseline to 4 during self recording. Number of episodes reached a high of 7 by the 106th session.

During academic activities, there was an increase in the number of episodes from 0 during baseline to 10 during the first four sessions of self recording. During the last four sessions, the range was 4 to 6 episodes per session.

As described in the procedures section, when Teacher 1 did not self recorded during an entire session, instructions to self record were provided before the next session (see Table 4.) This happened in conversation and snack activities prior to beginning sessions 23 and 46, and in academic activities prior to beginning session 102. Following additional instruction on session 23 (arrow 1,) the number of incidental teaching episodes

increased from 0 to 5. Following additional instruction on session 46, the number of episodes increased from 2 to 3 (arrow 2.) Following additional instruction on session 102 of the academic activities, the number increased from 0 to 7 (arrow 3.)

### Teacher 2/Child 2

Teacher 2 Data were obtained during conversation and snack, play, and group activities, as shown on the three separate graphs of Figure 2. Figure 2 displays the number of incidental teaching episodes completed by Teacher 2 with Child 2 targeting use of number adjectives across three sets of classroom materials and environmental arrangements during baseline and self recording.

During conversation and snack activities, as shown on the top graph of Figure 2, incidental language teaching occurred during baseline three times during the first 5 sessions, and not at all during the last five sessions. With the introduction of self recording, there was an increase to 3 and 5 episodes during the first two sessions. The number of episodes was highly variable throughout the self-recording condition, reaching a high of 8 in session 102.

During play activities, incidental language teaching occurred during baseline had a range from 0 to 1. By the fourth session of self recording, the number of incidental teaching episodes reached a high of 10, and subsequently had a range from 3 to 15.

For group activities, during baseline, incidental teaching had a range from 0 to 1. During the first session of self recording, number of episodes increased to 2. During the final 16 sessions of self recording, the range was 1 to 2.

As described in the procedures section, Teacher 2 was provided additional training on how to expand spontaneous language by Child 2 (Table 5.) This additional training was presented prior to sessions 25 and 54 of the conversation and snack activities. On session 25 (arrow 1,) teacher use of incidental teaching increased from 1 to 6 episodes. On session 54 at arrow 2, there was an increase from 0 to 6.

Child 2 Data were also obtained on the spontaneous use of number adjectives for Child 2 across all three classroom activities during baseline and self recording.

As previously described, spontaneous initiations were scored when Child 2 used number adjectives to initiate statements (e.g., "I'll take a few chips."). The session numerals along the abscissa of Figure 3 are the same as for Figure 2. At session 14 for Teacher 2, data collection was started for Child 2. Thus, there are no data points for Child 2 prior to session 14.

In baseline, during conversation and snack activities, Child 2 did not spontaneously use the target language form when initiating for desired objects. Within the first 6 sessions of teacher self recording, his use of number adjectives over baseline increased. During the next 34 sessions, there was a gradual increase to 8 spontaneous uses of number adjectives. From session 59 to 101, number of spontaneous uses had a range from 3 to 8, with the exception of sessions 77 and 78, when number of uses fell to 2 and 0, respectively.

During play activities, as shown on the middle graph of Figure 3, during baseline, Child 2 did not spontaneously use the targeted language form. Within the first 6 sessions of self recording, the number of spontaneous uses increased from 0 to 8. That increase maintained over the next 6 sessions, with the exception of session 56, when the number of spontaneous uses decreased to 2. From session 66 to 91, the number of spontaneous uses gradually decreased from 7 to 1, with the exception of session 79, when the number increased to 8.

During group activities, as shown on the bottom graph of Figure 3, during baseline, from session 14 to 34, Child 2 emitted two spontaneous uses of number adjectives. During the remainder of baseline (sessions 35 to 68), no spontaneous uses were observed. With the introduction of self recording, from session 77 to 96, the number of spontaneous uses remained at 0, but on sessions 96 and 97, they increased to 1 and 2 respectively.

In addition to recording the number of spontaneous uses of number adjectives, we also recorded the different types of number-adjective statements emitted by Child 2. The different types of statements emitted at least once during blocks of 10 sessions, during both conversation and snack activities and play activities, are presented in Figure 4.

During conversation and snack activities (top graph), the first arrow indicates the point at which additional training was provided to Teacher 2 on how to expand on child spontaneous language (the arrow corresponds to session 25 on Figure 3.) Figure 4 shows, that prior to providing this additional training, Child 2 spontaneously initiated for desired objects using the phrase "I want (number) (desired object)." Following the additional training, Child 2 spontaneously initiated for desired objects using a number adjective and one or two additional descriptive adjectives (e.g., "I want one little black oreo.")

The second arrow during conversation and snack activities, indicates the next point at which additional training was provided to Teacher 2 (the arrow corresponds to session 54 on Figure 3.) Figure 4 shows, that following this training, Child 2 further varied his spontaneous statements; for example, he said "I want 2 more," and "I want a lot of chips."

During play activities, Child 2 also varied the type of number-adjective statements spontaneously emitted, although additional training was not provided to Teacher 2 during these activities. This figure shows that prior to the additional training provided to Teacher 2 during conversation and snack activities, Child 2 spontaneously initiated for desired objects during play activities using a number adjective along with one or two descriptive adjectives. For example, Child 2 initiated for desired play objects using the statement, "I want one big red block." Following the additional training provided to Teacher 2 during conversation and snack activities, Child 2 varied his statements during play activities. For example, prior to reaching for a puzzle piece, Child 2 stated, "I want this one," and "I want a couple of your pieces."

During group activities, Child 2 spontaneously initiated on sessions 96 and 97, using number adjectives only (e.g., "I want one book;" "I need one cup." )

### Teacher 3/Child 3

Teacher 3 Data were obtained during conversation and snack, play, and academic activities, as shown in Figure 5. This figure replicates the previous findings, and shows the number of incidental teaching episodes completed by Teacher 3 with Child 3 targeting child use of size adjectives across conversation and snack, play, and academic activities during baseline and self recording.

During conversation and snack activities, there was only one incidental teaching episode during baseline, and that episode occurred during the first session. No further episodes were observed during the last seven sessions. Within the first session of self recording, number of episodes increased from 0 to 5. Within the next ten sessions, there was an increase to 8 episodes. During the remaining 92 sessions, number of episodes had a range from 1 to 16.

Incidental teaching was not observed in play activities during baseline. Within the first 3 sessions of self recording, the number of episodes increased from 0 to 5. The number of episodes throughout the remainder of the self-recording condition, had a range from 0 to 4 episodes per session.

During academic activities, as shown on the last graph of Figure 5, during baseline, the number of incidental teaching episodes had a range from 0 to 2. During the first session of self recording, the number increased to 5. During the final 22 sessions of self recording, the number had a range from 1 to 3.

Child 3 Although child behavior is not shown in Figure 5, a problem in child performance emerged between sessions 13 and 47 during conversation and snack activities. Child 3 consistently requested "big" snack items. As a result, a new snack tray was introduced. The new tray had six compartments for "big" snacks, and six compartments for groups of "little" snacks. The big snacks might have been whole

pretzels, and the little snacks might have been a cup filled with little pretzel pieces. Now, regardless of whether "big" or "little" snacks were requested, the child received the same amount of snack. Following the introduction of the new snack tray, Child 3 requested both "big" and "little" snacks.

Along with the data for Teacher 3, data were obtained on the performance of Child 3. Figure 6 displays the number of spontaneous uses of size adjectives for Child 3 across all three settings during baseline and self recording.

As described in the procedure section, a spontaneous initiation was scored when Child 3 used a size adjective to initiate a statement (e.g., "Can I have the big chip?"). In Figure 6, the session numerals along the abscissa are the same as for Figure 5. That is, these data are the teacher's session numbers. At session 9 for Teacher 3, data collection was started for Child 3. Thus, there are no data points for Child 3 prior to session 9 for Teacher 3. The closed circles display the number of spontaneous uses of the adjective "big". The open circles display the number of spontaneous uses of the size adjective "little."

The data show that during baseline, across all three classroom activities, Child 3 did not spontaneously use size adjectives when initiating for desired objects. During conversation and snack activities, as shown on the top graph of Figure 5, the introduction of self recording did not result in an immediate increase in the spontaneous use of the adjective "big." Between session 24 and 40, Child 3 began to spontaneously use the adjective "big." Beginning on session 41, Child 2 began to only select "big" snacks, and began to spontaneously use the word "big" each time she reached for a snack. From session 41 to 46, the number of spontaneous uses of the adjective "big" had a range of 10 to 12. At session 47, the new snack tray was introduced, so that both big and little snacks were requested. From session 52 to session 98 (with the exception of sessions 57 and 67,) the number of correct spontaneous uses of the adjective "big" had a range from 1 to 6. Child 3 did not spontaneously use the descriptor adjective "little."

Nevertheless, throughout the self-recording condition during play activities, the number of spontaneous uses of "big" remained at zero with the exception of sessions 74, 76, and 96, in which number of spontaneous uses was 2, 1, and 1, respectively. Child 3 did not spontaneously use the size adjective "little."

In the first two sessions of self recording during academic activities, number of spontaneous uses of "big" increased from 0 to 3, and throughout the remainder of this condition, had a range from 0 to 2. As in the other two activities, Child 3 did not spontaneously use "little."

Data were obtained also on the prompted performance of Child 3. Figure 7 displays the number of prompted uses of size adjectives following teacher questions across all three settings during baseline and self recording.

As described in the procedure section, a prompted use of a size adjective was scored when Child 3 provided a correct response, following a teacher's verbal request for an elaboration (e.g., "Is this a big or little (object)?") The data in Figure 7, show that during baseline, across all three sets of classroom activities, with the exception of three episodes during academic activities, Child 3 was not provided opportunities to respond to teacher questions requiring use of size adjectives. During conversation and snack activities, as shown on the top graph of Figure 7, during self recording, Child 3 correctly used the adjectives "big" and "little" in response to teacher questions. The number of uses of the adjective "big" had a range of 0 to 9. The number of uses of the adjective "little" had a range of 0 to 2 between sessions 13 and 78, and then increased to a range of 1 to 4 during sessions 80 to 98.

During play activities, as shown on the middle graph of Figure 7, during self recording, the number of correct uses of the adjective "big," had a range of 0 to 2. On only one occasion, session 68, Child 3 correctly responded to a question requiring use of the adjective "little."

During academic activities, as shown on the bottom graph of Figure 7, during self recording, the number of correct uses of the adjective "big" had a range of 0 to 2. The number of correct uses of the adjective "little" had a range of 0 to 1.

#### Accuracy of Teacher Self Recording

To assess the accuracy of teacher self recording, the present study compared the number of incidental teaching episodes recorded by the self recorder to the number of episodes recorded by the author. Percentage agreement was calculated by dividing the smaller frequency by the larger frequency and multiplying by 100. These data show that agreement between the experimenter and Teacher 1, 2, and 3 was 73%, 77%, and 86%.

### Discussion

#### Overall Effectiveness of Self Recording

A functional relation between self recording and incidental teaching was demonstrated by the systematic increase in the number of incidental teaching episodes targeting specific language forms following the introduction of self recording across three sets of classroom materials and environmental arrangements. In the present study, self recording followed a pre-baseline training period, during which teachers learned the basic skills of incidental teaching with children with autism. Under the self-recording condition, the increase in teacher use of incidental teaching was maintained over a 12 month period. These findings support the conclusion that self recording can promote the maintenance of treatment gains over time and across settings (e.g., Bellack, Rozensky & Schwartz, 1974; Burg, Reid, & Lattimore, 1979; Burgio, Whitman, & Reid, 1983; Gajar, Scholss, Scholss, & Thompson, 1984; Kissel, Whitman, & Reid, 1983; Maletzky, 1974; Richman, Riordan, Reiss, & Pyles, 1988; Romanczyk, 1974).

Nevertheless, the use of the term "maintenance" in the present study is not entirely clear, because this study did not demonstrate the effectiveness of the pre-baseline training package. Demonstration of the effectiveness of the training package did not seem warranted, because its effectiveness had already been demonstrated in a previous study

(McDuff et al., 1988). In 1988, McDuff et al. demonstrated that teacher use of incidental teaching generalized from a training setting to nontraining settings during which preferred objects were carefully arranged to encourage child initiations. The present study investigated the extent to which the pre-baseline training procedures were sufficient to produce teacher behavior change in a special education classroom, during which other adaptive skills were being trained concurrently, and during which there was limited ability to control environmental conditions. The present study showed that the training procedures alone were insufficient to produce teacher behavior change in the classroom settings. Teacher behavior changed only following the introduction of self recording.

If the reader assumes that the pre-baseline training package was responsible for training the teachers to use incidental teaching, then self recording might be best regarded as a maintenance procedure. It is unlikely that self recording alone, in the absence of the pre-baseline training, would have been effective. Even if self recording is not regarded as a maintenance procedure, it may still be viewed as a powerful procedure, simply because the behavior it supported was durable over a 12-month period.

Although the results show the effectiveness of self recording in facilitating teacher use of incidental teaching to increase targeted language forms, some changes in procedure were introduced and tailored to the different repertoires of each teacher/child dyad. Teacher 1 required additional reminders to self record. Teacher 2 required additional training on how to request elaborations on child spontaneous language. Teacher 3 required a new snack tray during the conversation and snack activities to encourage Child 3 to request "little" snacks as well as "big" snacks. For all three teacher/child dyads, self-recording alone was not sufficient to produce all the desired staff behavior involved in incidental teaching.

There are at least two functions of self recording that might have resulted in the increase in incidental teaching in the present study. First, the self-recording data sheet might have served as a discriminative stimulus for the incidental teaching behavior. It is

interesting to note that the environmental arrangement and classroom materials associated with each leg of the multiple-baseline experimental design were not mutually exclusive, even though they functioned independently in the experimental design. That is, generalization did not occur across those arrangements and materials, even though they were very similar. For example, for Teacher 1 with Child 1, the same coloring materials, trains, and cars were used during both play and academic activities. For Teacher 2 with Child 2, the same books were used during play and group activities. For Teacher 3 with Child 3, the same snack tray was used during snack and academic activities. Thus, classroom materials and environmental arrangements, did not set the occasion for incidental teaching. Therefore, the self-recording data sheet may have functioned as a discriminative stimulus for incidental teaching.

Second, the self-recording data sheet might have had a reinforcing function for teacher use of incidental teaching. Each checkmark on the data sheet represented the completion of an episode, and indicated a cumulative increase in the number of incidental teaching episodes completed. To enhance possible reinforcement functions of the self-recording procedure, use of the data sheet produced a bar graph, the height of which signified the total number of episodes completed each day. A comparison could be made of the total number of episodes completed on consecutive days. A gradual increase in the height of the bar graph, or a stable height of the bar graph over time, may have influenced teacher use of incidental teaching on subsequent days.

The increase in teacher use of incidental teaching following the introduction of self recording was demonstrated during regularly scheduled classroom conversation and snack activities, play activities, academic activities, and group activities. Incidental teaching in naturalistic settings provided opportunities for language models to be presented to each child while that child was engaged in other activities (McGee et al., 1983). Each child had opportunities to practice target language responses (i.e., use of prepositions, number adjectives, or size descriptors), while simultaneously engaging in

other classroom activities. For example, Child 1 used prepositions when selecting a favorite book to read, Child 2 used number adjectives when placing puzzle pieces into the puzzle frame, and Child 3 used size adjectives when putting her doll in big or little dollhouse beds.

Throughout regularly scheduled classroom activities, teachers made decisions about the specific phrases to be taught. Following an initiation, Teacher 1 consistently asked Child 1, "Where is the (object)?" Teacher 2 varied the phrases practiced. First, she requested elaborations using only number adjectives (e.g., "Say, 'I want one cookie'"). Then, she requested a number adjective and an additional descriptor adjective (e.g., "Say, 'I want one small cup'"); then, a number adjective and two additional descriptors (e.g., "Say, 'I want one big white cup'"); and lastly, she varied the form of number adjectives (e.g., "Say, 'I want a couple of those cookies;' " "Say, 'I only want a few pieces'"). Teacher 3 targeted phrases by fully modeling the desired response (e.g., "Say, 'Can I have the big chip?"), or by asking questions (e.g., "Is that a big or little car?").

#### The Effect of Incidental Teaching on Child Behavior

The effects of teacher use of incidental language training on child spontaneous language was assessed for Child 2 and Child 3. For Child 2, the systematic increase in incidental teaching that followed the introduction of self recording across classroom materials and environmental arrangements coincided with systematic increases in his spontaneous use of number adjectives. Initially, he spontaneously used number adjectives alone when requesting desired objects (e.g., "I want two chips.") Then, the spontaneous initiations began to include additional descriptors (e.g., "I want six big chips.") Finally, he varied the type of number-adjective statement used (e.g., "I only want a few;" "Can I have some more?") This increase in spontaneous language supports the literature suggesting that incidental teaching is an effective intervention procedure for increasing language use in children with autism (e.g., MacDuff et al., 1988; McGee et al., 1992; McGee et al., 1985; McGee et al., 1986; McGee et al., 1999).

For Teacher 2, additional training on how to further expand spontaneous language was provided during conversation and snack activities. This training, together with pre-baseline training sessions and self recording, coincided with an increase in the types of number-adjective statements spontaneously emitted by Child 2 during these activities. This training was not provided during play activities. Nevertheless, the increase in the types of number-adjective statements emitted by Child 2 during conversation and snack activities generalized to an increase in the types of statements emitted during play activities. These findings support the conclusion that incidental teaching produces spontaneous language, and promotes the generalization of the spontaneous language across activities (e.g., McGee, Krantz & McClannahan, 1985). One might expect such findings because incidental teaching involves procedures recommended by Stokes and Baer (1977) to promote generalization, including: (a) "aiming for natural contingencies of reinforcement"; (b) "loose teaching;" (c) "using multiple exemplars;" and (d) "using indiscriminable contingencies."

In addition, for Child 2, following the introduction of self recording, frequent teacher use of incidental teaching during both conversation and snack and play activities provided frequent opportunities for Child 2 to practice use of number adjectives. During these activities, he often spontaneously used number adjectives. In contrast, less frequent teacher use of incidental teaching during group activities provided him with few opportunities to practice, and with the exception of three spontaneous uses following the introduction of self recording, he did not spontaneously use number adjectives during group activities.

Following the introduction of self recording, Child 3 spontaneously used the size adjective "big" when initiating for "big" snacks (e.g., "Can I have a big chip.") Nevertheless, she did not spontaneously use "little" when initiating for "little" snacks. This failure may, in part, be attributed to the fact that prior to the introduction of the new snack tray on session 44, Child 3 initiated only for "big" snack items. As a result, she

was rewarded for a long period of time for using only this adjective. Nevertheless, the adjective "little" did have meaning for Child 3, as evidenced by the increase in the number of prompted uses of this size adjective following the introduction of self recording across both conversation and snack and academic activities.

Although the introduction of self recording did not result in a systematic increase in spontaneous or prompted use of size adjectives, an increase in the targeted language did emerge over the course of the self-recording condition. Frequent teacher use of incidental teaching during conversation and snack activities provided many opportunities for her to practice using these adjectives, and she frequently engaged in spontaneous use of the size adjective "big," and in the prompted use of the size adjective "little." In contrast, less frequent teacher use of incidental teaching during play and academic activities provided her with few opportunities to practice use of the size adjectives during these activities. With the exception of a few spontaneous and prompted uses of the size adjectives during these two sets of activities, Child 3 did not frequently engage in spontaneous use of the size adjective "big," or prompted use of the size adjective "little." The findings for both Child 2 and Child 3 are consistent with the literature, suggesting that incidental teaching needs to occur frequently enough to ensure sufficient trials for new skills to be learned (Warren et. al., 1986).

The increase in spontaneous language, and the increase in prompted language may have increased teacher use of incidental teaching. The phrases spontaneously emitted by the child, and the appropriate eye contact that accompanied her language, may have functioned as powerful, naturally available communities of reinforcement that contributed to the maintenance of incidental teaching.

#### Possible Stimulus Control of Teacher Behavior

It is likely that the classroom materials and the environmental arrangements, themselves, might have influenced the number of incidental-language teaching episodes completed, and, ultimately, child spontaneous language. During conversation and snack

activities, each child had frequent opportunities to initiate for small portions of preferred snacks, thus providing frequent opportunities for incidental teaching.

Furthermore, during play activities, Teachers 2 and 3 each supervised two children simultaneously. The distribution of teacher attention between the two children might have influenced the number of incidental teaching episodes completed. During group activities, Teacher 3 distributed her attention among three children. In addition, the activities targeted during the group activities each took two to four minutes to complete (e.g., reading a story to a group, playing musical chairs, playing hot potato). Following the initial child initiation to engage in an activity, few opportunities for child initiations were created, thus limiting the overall number of episodes completed. Similarly, during academic activities, the length of the activities (e.g., reading a book; handwriting tasks) limited the number of possible initiations.

#### Accuracy of Teacher Self Recording

It is interesting to note that self recording systematically increased teacher use of incidental teaching regardless of accuracy of self recording. These findings are consistent with the findings of Lee et al. (1989), Nelson et al. (1975), Romanczyk et al. (1973), and Simkins (1971). The accuracy with which Teachers 1 and 2 self recorded had a mean less than 80%. Several factors may have contributed to inaccuracy. First, for Teacher 1, self recording did not always occur immediately following the occurrence of an episode. Recording frequently took place at the end of the session. Second, Teachers 1 and 2 used several paper-and-pencil data-collection procedures on multiple responses targeted during experimental sessions. Often, incidental teaching episodes were not scored. Third, for both teachers, the self-recording data sheet was frequently placed underneath other data collection materials. The data sheet was not always readily within view. Lastly, it was difficult for the observer(s) to hear everything that was said during each session. Low volume on the part of the teacher, coupled with phone interruptions, other teacher and child responses, opening and closing doors, the air conditioner, the TV, and the CD

player sometimes made it difficult to hear. These factors may have contributed to inaccuracies in data collection.

In applied research, ideal opportunities for data collection are not always available because of the variability of conditions in natural settings. In the classroom, there was limited ability to control environmental conditions. Future researchers might attempt to minimize classroom disruptions by: (a) identifying a self-recording device that does not compete with other paper-and-pencil data-collection activities (e.g., a wrist counter); and (b) placing a microphone on the child's person, so that verbal utterances can better be heard.

#### Future Research

In the present study, the self-recording data sheet did not identify target responses. In the future, a self-recording data sheet could be designed to prompt a teacher to address specific goals through incidental teaching. The discriminative stimulus control provided by the data sheet could be enhanced by: (a) identifying appropriate language prior to the session; (b) identifying the number of phrases to target during a given session; (c) identifying criteria for determining when additional phrases should be introduced; and (d) identifying the activities during which incidental teaching should occur. Perhaps, by setting more specific goals, even more clinically important change in teacher behavior could be expected (Kazdin, 1974).

The present study is a beginning attempt to develop a staff-training protocol to facilitate teacher use of incidental teaching during regularly scheduled classroom activities. Additional research is needed to continue to develop effective models for including incidental teaching in the curriculum of special education classrooms.

Table 1

Written Description of Components in Incidental Teaching Provided to Each Teacher

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Initiations include reaching for, pointing to, or gesturing toward an item, as well as asking questions ("May I have some water?" "Book?") and making verbal requests ("I want water please", "puzzle"). Looking at a snack or toy is not considered an initiation.

Requests for Elaboration include requests for verbal responses. Requests for more elaborate verbal responses include asking questions about a toy or snack (e.g., "How many cookies are you eating?"; "Where is the book?"; "What are you playing with?"); asking for verbal imitation (e.g., "Say, 'I am eating two cookies';" "Say, 'The book is on the table'"; "Say, 'I am playing with the Barbie Doll.'"); or asking for more appropriate volume, articulation, sentence construction, or word usage. Requests for elaboration occur only if the teacher asks for a response that is contextually related to the item for which the child initiates. Thus, if the child is eating two cookies, the teacher's question about math class is not considered a request for elaboration.

Child elaborations occur if they represent responses to the teacher's questions or requests.

Providing the requested item occurs when the teacher gives the child the object for which he or she initiated before the topic of conversation changes.

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Table 2

**Activities During Each of the Five Training Sessions**

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**DAY 1**

1. Trainer gives teacher written description of the steps in incidental teaching.
2. Trainer reads the description aloud to the teacher.
3. Trainer provides teacher opportunities to ask questions or request clarification.
4. Trainer remains available for questions throughout the training session.
5. Trainer and/or teacher read 6 examples of incidental teaching aloud, and teacher writes two examples of her own.
6. Trainer remains available for questions while teacher writes examples.

**DAY 2**

7. Trainer and/or teacher read 5 examples of incidental teaching aloud, and teacher writes three examples of her own.
8. Trainer remains available for questions while teacher writes examples.

**DAY 3**

9. Trainer and/or teacher read 4 examples of incidental teaching aloud, and teacher writes four examples of her own.
10. Trainer remains available for questions while teacher writes examples.

**DAY 4**

11. Trainer and/or teacher read 3 examples of incidental teaching aloud, and teacher writes five examples of her own.
  12. Trainer remains available for questions while teacher writes examples.
- 

(Table continues)

Table 2 (cont.)

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**DAY 5**

13. **Trainer and/or teacher read 3 examples of child initiations that would not result in incidental teaching, and teacher writes 1 example of her own.**
  14. **Teacher writes six examples of incidental teaching of her own.**
  15. **Trainer remains available for questions while teacher writes examples.**
-

Table 3

**Instructions to Each Teacher Prior to Beginning Self Recording**

---

1. Trainer hands self-recording chart/clipboard to teacher.
  2. Trainer reads aloud the target response (e.g., incidental teaching to increase child use of prepositions).
  3. Trainer reads aloud the components in incidental teaching.
  4. Trainer asks if teacher has any questions regarding the components in incidental teaching.
  5. Trainer instructs teacher to record each incidental teaching episode daily throughout the targeted set of activities.
  6. Trainer instructs teacher to record each episode each day with a pencil.
  7. Trainer instructs teacher to record each incidental teaching episode immediately following its occurrence with pencil.
  8. Trainer instructs teacher to use yellow marker to indicate total number of episodes completed following completion of targeted set of activities.
  9. Trainer offers to help teacher find place to keep clipboard.
  10. Trainer instructs teacher that if data sheet is filled or misplaced, ask trainer for a new one.
-

Table 4

**Additional Instructions Provided by the Trainer to the Teacher to Self Record**

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1. Ask Teacher to look at the self-recording data sheet.
  2. Remind Teacher to record each incidental teaching episode with a pencil.
  3. Remind Teacher to use a yellow marker to indicate total number of episodes completed per day.
  4. Instruct Teacher to skip column if the number of episodes on a given day is zero.
  5. Discuss the ease/difficulty of the self-recording system. Does the self-recording system need to be modified?
  6. Thank Teacher for showing the trainer the data sheet.
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Table 5

Additional Training on How to Expand Child Utterances Using Incidental Teaching


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1. Trainer:	"Let's start talking about some next steps in incidental teaching." _____
2. Trainer:	"Let's review the goal of incidental teaching. Can you tell me the goal of incidental teaching?" (Teacher response should include a statement about expanding child language following an initiation)
	Teacher states the goal _____
	Teacher is unable to state the goal _____
	If teacher is unable to state goal, provide goal statement. _____
3. Trainer:	"When (Child 2) initiates, "I want 2 chips," what verbal elaborations might you require?"
	Teacher to provides an elaboration _____
	Teacher is unable to provide an elaboration _____
	If teacher is unable to provide elaboration, provide one. _____
Trainer:	"That's a great verbal elaboration, now walk me through a possible incidental teaching episode.
	Teacher describes an episode. _____
	Teacher is unable to describe an episode. _____
	If teacher is unable to describe an episode, provide one. _____

---

(table continues)

Table 5 (continued)

---

4. Trainer: "Here is another example, "When (Child 2) initiates, 'I'm gonna get three cookies', what verbal elaboration might you require?"

Teacher provide an elaboration \_\_\_\_\_

Teacher is unable to provide an elaboration \_\_\_\_\_

If teacher is unable to provide elaboration,  
provide one. \_\_\_\_\_

Trainer: "That's a great verbal elaboration, now walk me through the a possible incidental teaching episode.

Teacher describes an episode \_\_\_\_\_

Teacher is unable to describe an episode \_\_\_\_\_

If teacher is unable to describe an episode,  
provide one. \_\_\_\_\_

---

(table continues)

Table 5 (continued)

---

5. Trainer:	"Can you provide me with an initiation that you might expect from (Child 2)? What verbal elaboration might you require?"	
	Teacher provides an elaboration	_____
	Teacher is unable to provide an elaboration	_____
	If teacher is unable to provide elaboration, provide one.	_____
Trainer:	"That's a great verbal elaboration, now walk me through a possible incidental teaching episode.	
	Teacher provides an episode	_____
	Teacher is unable to provide an episode	_____
	If teacher is unable to provide an episode, provide one.	_____

---

(table continues)

Table 5 (continued)

---

6. Trainer:	"Can you provide me with another initiation that you might expect from (Child 2)? What verbal elaboration might you require?"	
	Teacher provides an elaboration	_____
	Teacher is unable to provide an elaboration	_____
	If teacher is unable to provide elaboration, provide one.	_____
Trainer:	"That's a great verbal elaboration, now walk me through a possible incidental teaching episode.	
	Teacher describes an episode	_____
	Teacher is unable to describe an episode	_____
	If teacher is unable to describe an episode, provide one.	_____

---

(table continues)

Table 5 (continued)

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7. Trainer:	"Can you provide me with another initiation that you might expect from (Child 2)? What verbal elaboration might you require?"	_____
	Teacher provides an elaboration	_____
	Teacher is unable to provide an elaboration	_____
	If teacher is unable to provide elaboration, provide one.	_____
Trainer:	"That's a great verbal elaboration, now walk me through a possible incidental teaching episode.	_____
	Teacher describes an episode	_____
	Teacher is unable to describe an episode	_____
	If teacher is unable to describe an episode, provide one.	_____
8. Trainer:	"Do you have any questions?"	_____
9. Trainer	"Thank you for meeting with me."	_____

---

Table 6

**Interobserver Agreement on Teacher Use of Incidental Teaching Targeting Specified Language Forms**

---

**Teacher 1 - Incidental Teaching Targeting Child Use of Prepositions**

<b><u>Activities</u></b>	<b><u>Baseline (Range)</u></b>	<b><u>Self Recording (Range)</u></b>
Conversation/Snack	100%	94% (50-100%)
Play	93% (75-100%)	95% (80-100%)
Academic	100%	100%

**Teacher 2 - Incidental Teaching Targeting Child Use of Number Adjectives**

<b><u>Activities</u></b>	<b><u>Baseline (Range)</u></b>	<b><u>Self Recording (Range)</u></b>
Conversation/Snack	100%	94% (66-100%)
Play	100%	88% (60-100%)
Group	100%	94% (50-100%)

**Teacher 3 - Incidental Teaching Targeting Child Use of Size Adjectives.**

<b><u>Activities</u></b>	<b><u>Baseline (Range)</u></b>	<b><u>Self Recording (Range)</u></b>
Conversation/Snack	100%	99% (85-100%)
Play	100%	96% (50-100%)
Academic	100%	92% (50-100%)

---

Table 7

Interobserver Agreement on Child Use of the Targeted Language FormsChild 2 - Spontaneous Use of Number Adjectives.

<u>Activities</u>	<u>Baseline (Range)</u>	<u>Self Recording (Range)</u>
Conversation/Snack	100%	86% (50-100%)
Play	100%	90% (60-100%)
Group	100%	100%

Child 3 - Spontaneous Use of the Size Adjectives.

<u>Activities</u>	<u>Baseline (Range)</u>	<u>Self Recording (Range)</u>
Conversation/Snack	100%	96% (50-100%)
Play	100%	72% (0-100%)
Academic	100%	80% (0-100%)

Child 3 - Partially Prompted Use of Size Adjectives.

<u>Activities</u>	<u>Baseline (Range)</u>	<u>Self Recording (Range)</u>
Conversation/Snack	100%	93% (50-100%)
Play	100%	100%
Academic	100%	100%

Figure 1

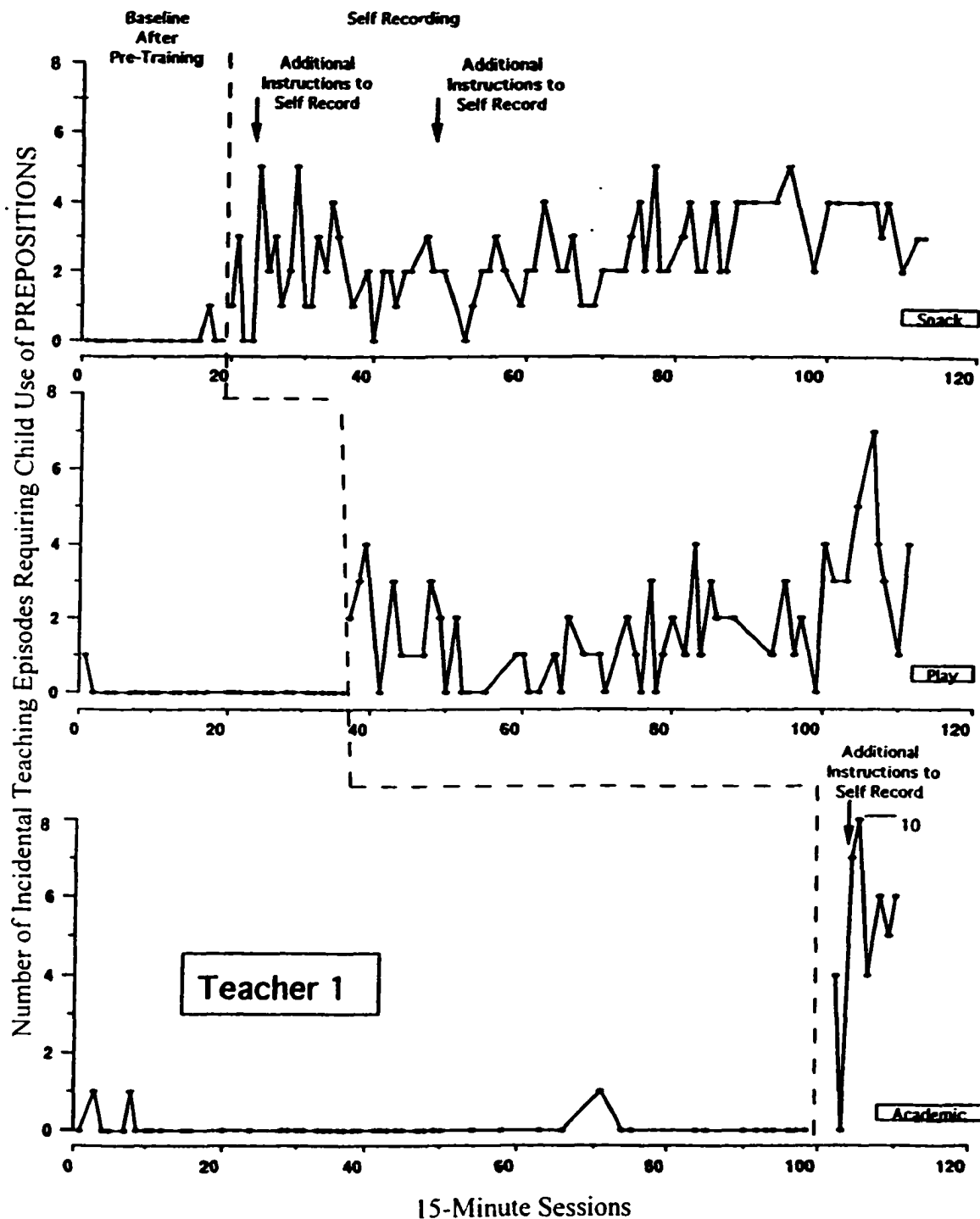


Figure 2

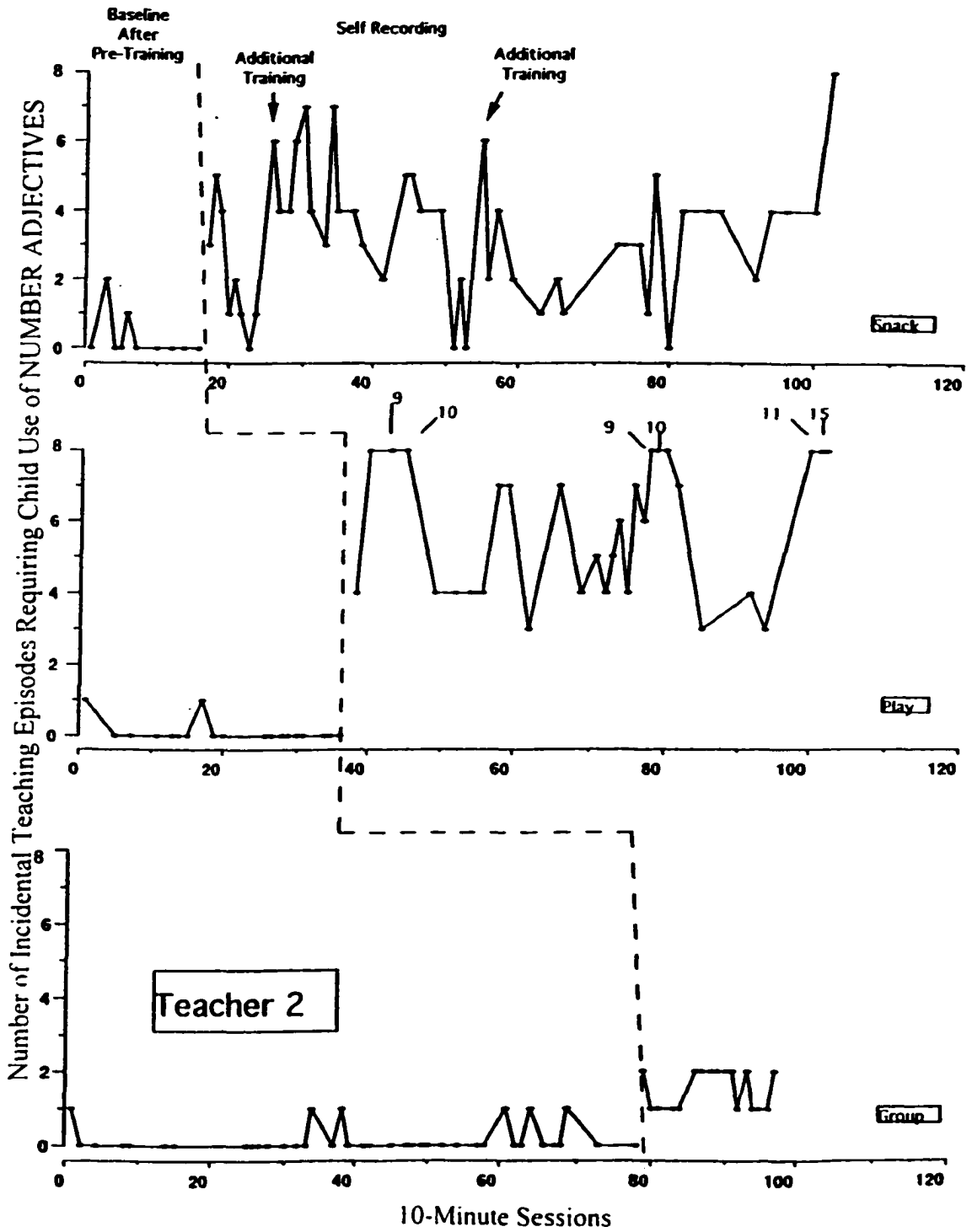


Figure 3

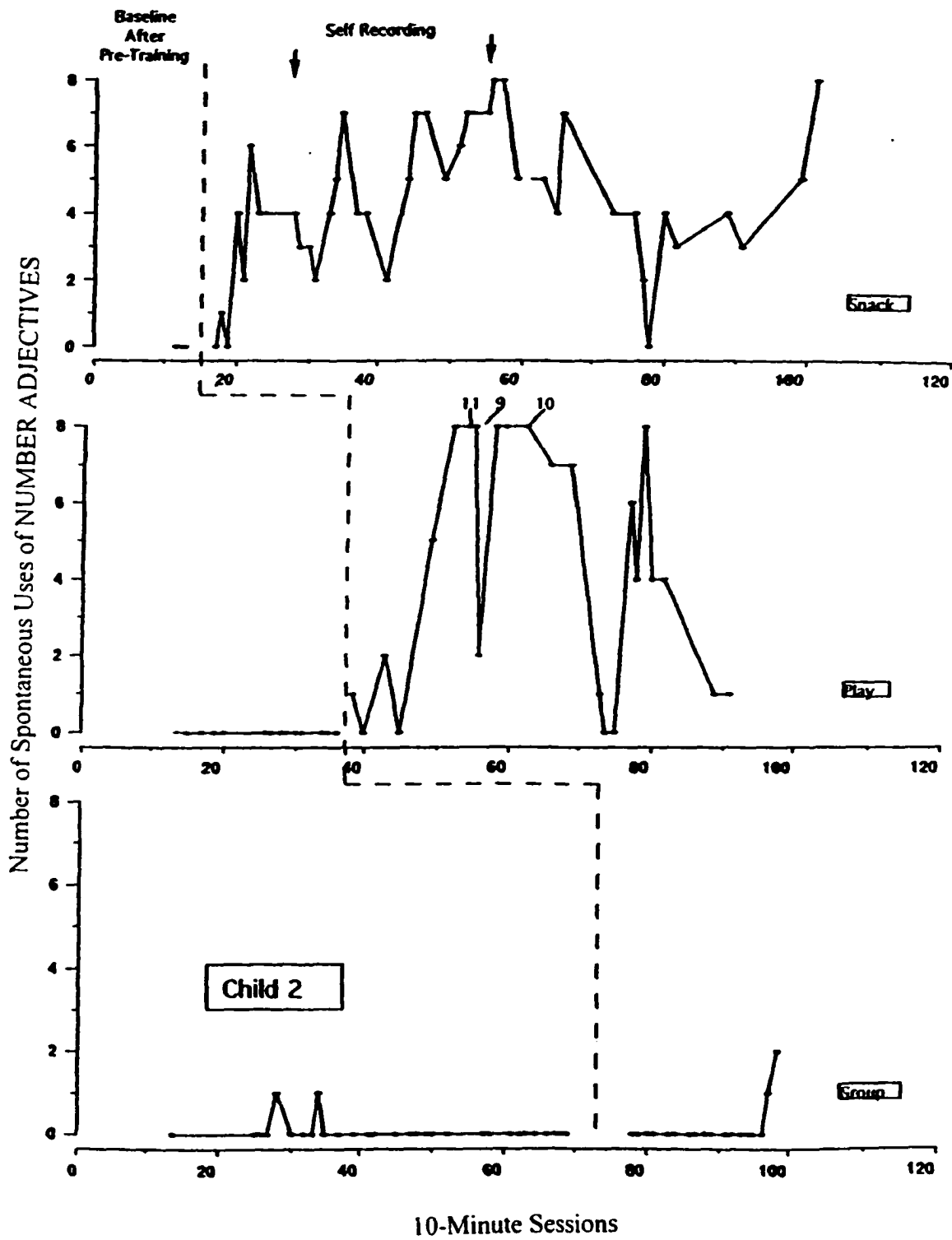




Figure 5

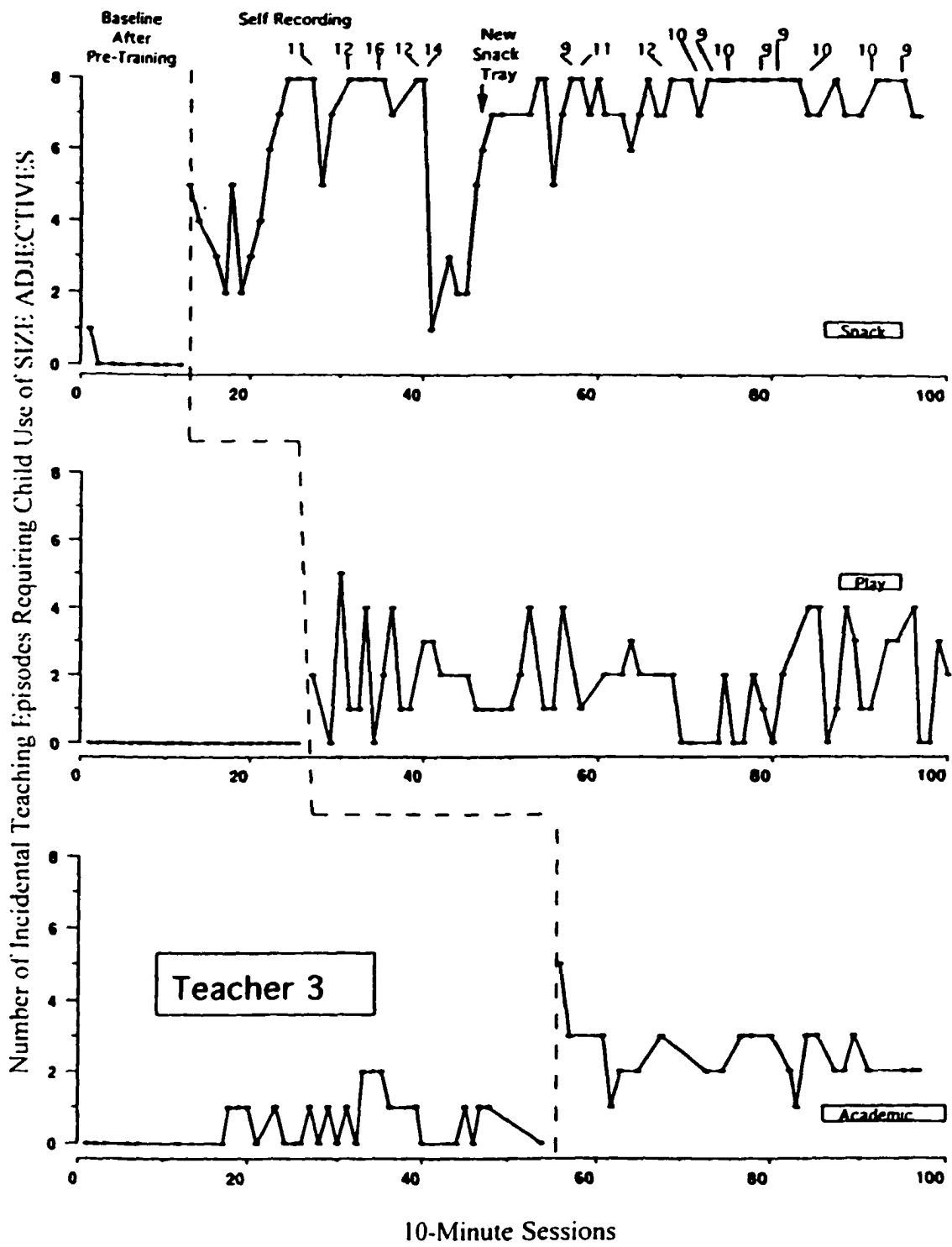


Figure 6

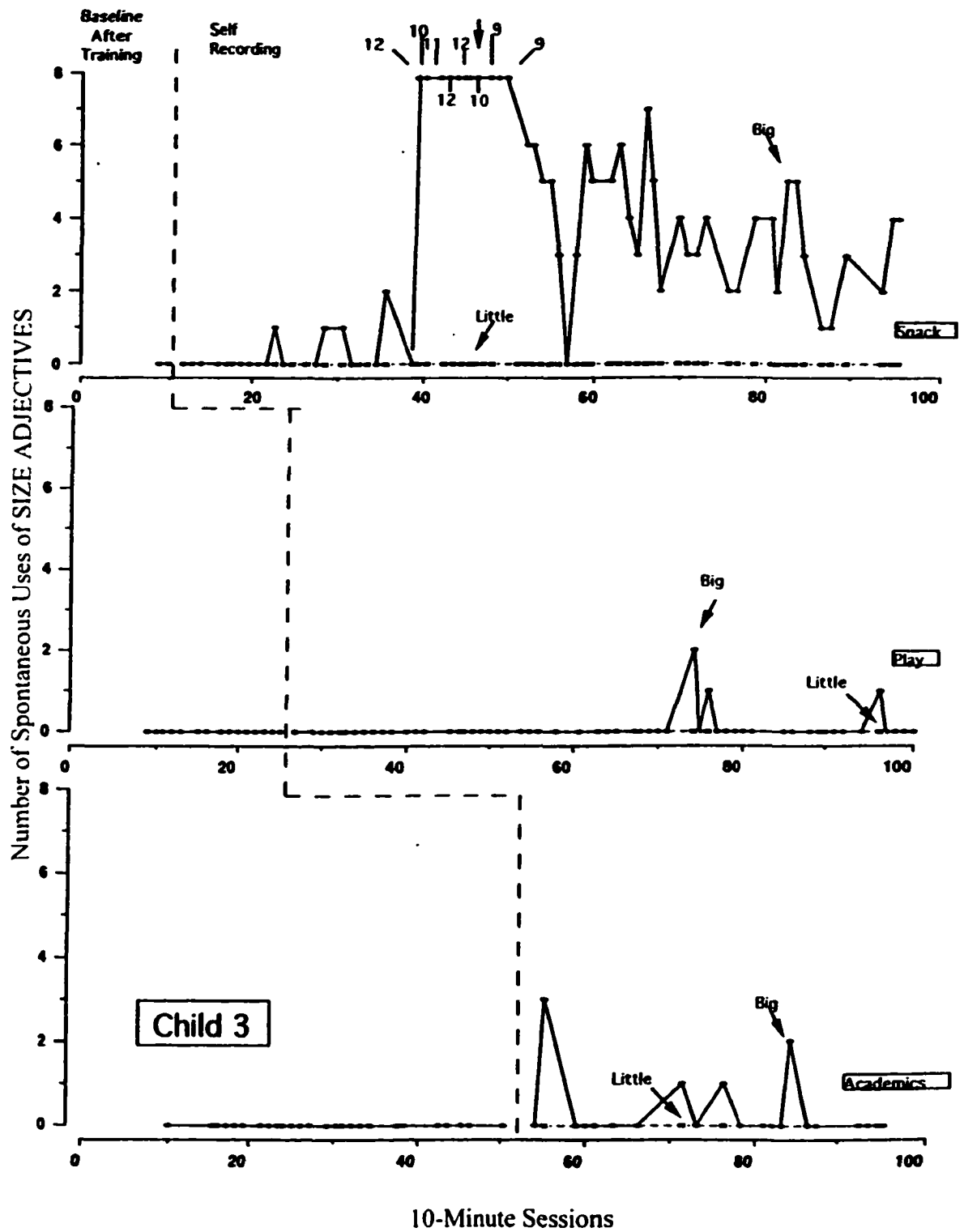
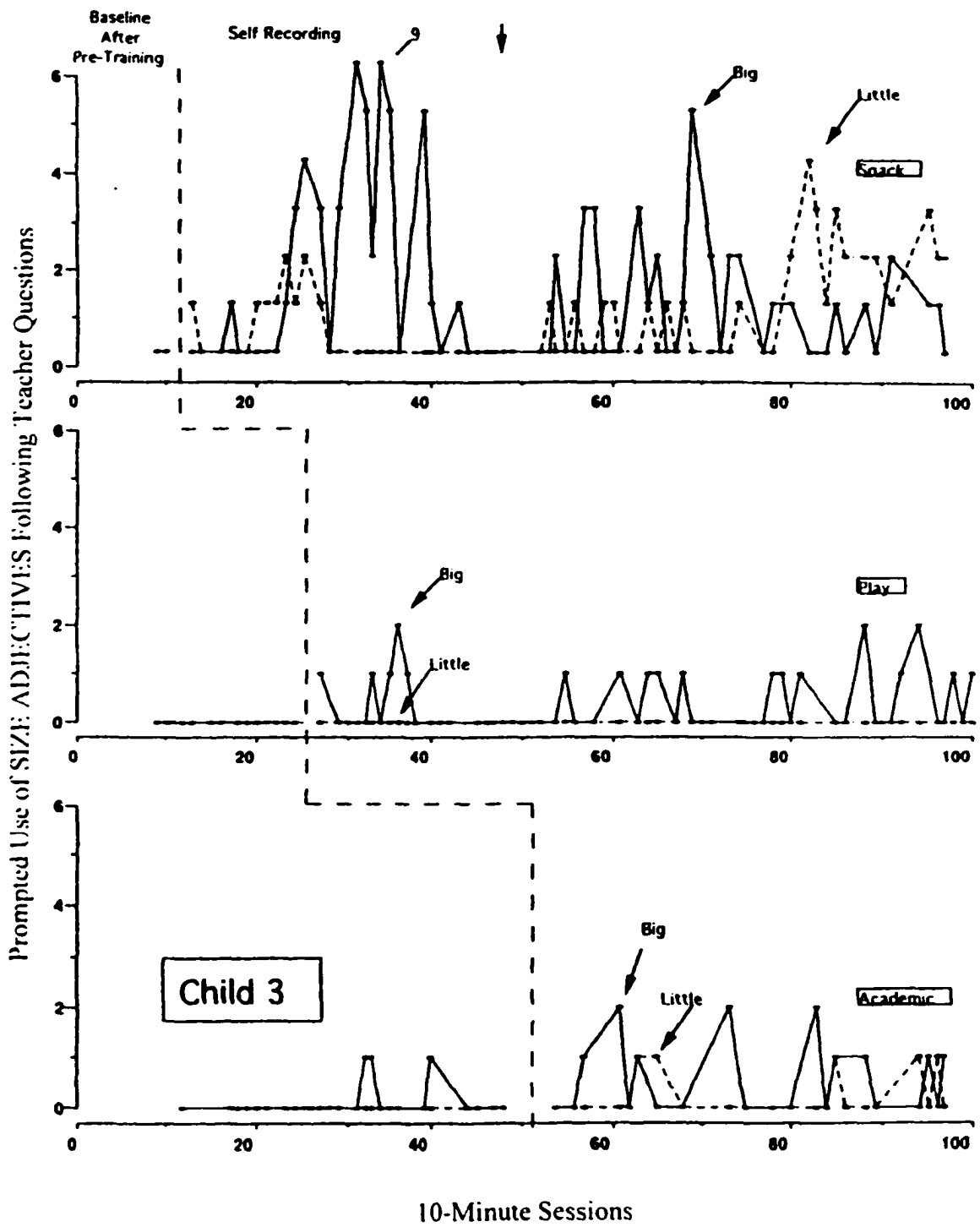


Figure 7



## Appendix A

### Written Examples of Incidental Teaching that Pertain to Preposition Use

#### TRAINING - DAY 1

- |                          |                                                                                                                                                    |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. The Initiation:       | The child reaches for a train                                                                                                                      |
| The Elaboration Request: | The teacher places her hand over the child's hand and asks, "Where is the train?"                                                                  |
| The Prompt:              | The child does not respond, so the teacher says, "Say, 'on the tracks'." The child responds to this prompt.                                        |
| The confirmation:        | The teacher gives the train to the child and says, "Good, you said 'on the tracks'."                                                               |
|                          |                                                                                                                                                    |
| 2. The Initiation:       | The child says, "I want the car."                                                                                                                  |
| The Elaboration Request: | The teacher asks, "What is the car next to?"                                                                                                       |
| The Prompt:              | The child responds incorrectly. The teacher prompts, "The car is next to the truck." "What is the car next to?" The child responds to this prompt. |
| The confirmation:        | The teacher gives the car to the child and says, "Great, you said 'the car is next to the truck'."                                                 |

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(appendix continues)

## Appendix A (continued)

- 
3. **The Initiation:** The child points to a cup
- The Elaboration Request:** Teacher asks "What cup are you pointing to?"
- The Prompt:** The child responds immediately and says, "the one on top of the plate."
- The confirmation:** The teacher hands the cup to the child and says, "Good, you told me 'the one on top of the plate'."
4. **The Initiation:** The child reaches for the plane in the handwriting bucket.
- The Elaboration Request:** The teacher asks, "Where is the plane?"
- The Prompt:** The child says "inside the bucket".
- The confirmation:** The teacher gives the plane to the child and says, "Wonderful, you said 'inside the bucket'."
5. **The Initiation:** The child takes a reader from the shelf.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "What book are you getting?"
- The Prompt:** The child responds immediately, "The one on the shelf."
- The confirmation:** The teacher gives the reader to the child and says, "Great, you said 'the one on the shelf.'"
- 

(appendix continues)

Appendix A (continued)

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6. **The Initiation:** The child reaches for a specific cookie.
- The Elaboration Request:** The teacher asks, "What cookie do you want?"
- The Prompt:** The child does not respond, and the teacher prompts, "Say, 'The one on top'." The child responds to this prompt.
- The confirmation:** The teacher gives the specific cookie to the child and says, "Wonderful, you told me 'the one on top'."

TRAINING - DAY 2

1. **The Initiation:** The child reaches for a car
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Where is the car?"
- The Prompt:** The child does not respond, so the teacher says, "Say, 'on the bridge'." The child responds to this prompt.
- The confirmation:** The teacher gives the car to the child and says, "Good, you said 'on the bridge'."

---

(appendix continues)

Appendix A (continued)

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2. **The Initiation:** The child says, "I want a puzzle."
- The Elaboration Request:** The teacher asks, "What is the puzzle next to?"
- The Prompt:** The child responds incorrectly. The teacher prompts, "The puzzle is next to the book."  
"What is the puzzle next to?" The child responds to this prompt.
- The confirmation:** The teacher gives the puzzle to the child and says, "Great, you said 'next to the book'."
3. **The Initiation:** The child says "I want the cookie."
- The Elaboration Request:** Teacher asks "Where is the cookie?"
- The Prompt:** The child responds immediately and says, "It's in the box."
- The confirmation:** The teacher hands the cookie to the child and says, "Good, you told me 'it's in the box'."
4. **The Initiation:** The child takes a car from the bucket.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Where is the car?"
- The Prompt:** The child responds immediately, "It's under the plane."
- The confirmation:** The teacher gives the car to the child and says, "Great, you said 'it's under the plane'."
- 

(appendix continues)

## Appendix A (continued)

- 
5. The Initiation: The child reaches for a bag of chips.
- The Elaboration Request: The teacher asks, "What is under the chips?"
- The Prompt: The child does not respond, and the teacher prompts, "Say, 'The pretzels are under the chips.'" The child responds to this prompt.
- The confirmation: The teacher gives the chips to the child and says, "Wonderful, you told me 'the pretzels are under the chips'."

## TRAINING - DAY 3

1. The Initiation: The child reaches for the boat
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "Where is the boat?"
- The Prompt: The child does not respond, so the teacher says, "Say, 'in the water'." The child responds to this prompt.
- The confirmation: The teacher gives the boat to the child and says, "Good, you said 'in the water.'"

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(appendix continues)

Appendix A (continued)

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2. **The Initiation:** The child says, "I want a train."
- The Elaboration Request:** The teacher asks, "What is the train next to?"
- The Prompt:** The child responds incorrectly. The teacher prompts, "The train is next to the book." "What is the train next to?" The child responds to this prompt.
- The confirmation:** The teacher gives the train to the child and says, "Great, you said 'the train is next to the book'."
3. **The Initiation:** The child says "I need a napkin."
- The Elaboration Request:** Teacher asks "Where is the napkin?"
- The Prompt:** The child responds immediately and says, "It's on the shelf."
- The confirmation:** The teacher hands the napkin to the child and says, "Good, you told me 'it's on the shelf.'"
4. **The Initiation:** The child takes a plane from the cubby
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Where is the plane?"
- The Prompt:** The child responds, "It's on the shelf."
- The confirmation:** The teacher gives the plane to the child and says, "Great, you said 'it's on the shelf.'"
- 

(appendix continues)

Appendix A (continued)

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5. The Initiation: The child reaches for a piece of chocolate.
- The Elaboration Request: The teacher asks, "Where is the chocolate?"
- The Prompt: The child does not respond, and the teacher prompts, "Say, 'The chocolate is behind the pretzels.'" The child responds to this prompt.
- The confirmation: The teacher gives the chocolate to the child and says, "Wonderful, you told me 'the chocolate is behind the pretzels.'"

TRAINING - DAY 4

1. The Initiation: The child says, "I want the train."
- The Elaboration Request: The teacher asks, "Where is the train?"
- The Prompt: The child responds incorrectly. The teacher prompts, "The train is under the bridge." "Where is the train?" The child responds to this prompt.
- The confirmation: The teacher gives the train to the child and says, "Great, you said 'under the bridge!'."

---

(appendix continues)

Appendix A (continued)

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2. **The Initiation:** The child reaches for a picture to draw
- The Elaboration Request:** The teacher places her hand over the child's hand and says, "Say, 'the train picture is on the shelf.'"
- The Prompt:** The child responds immediately and says, "The train picture is on the shelf".
- The confirmation:** The teacher allows the child to continue and says, "Good, you told me 'the train picture is on the shelf.'"
- 
3. **The Initiation:** The child reaches for a truck in the handwriting bucket.
- The Elaboration Request:** The teacher places her hand over the child's hand and says, "Say, 'I want the truck on top'."
- The Prompt:** The child responds immediately, "I want the truck on top."
- The confirmation:** The teacher says, "Great, you said I want the truck on top" and allows the child to take the truck.

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(appendix continues)

## Appendix A (continued)

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 TRAINING - DAY 5

- |                          |                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| 1. The Initiation:       | The child takes a reader from the shelf.                                                                     |
| The Elaboration Request: | The teacher places her hand over the child's hand and asks, "What book are you getting?"                     |
| The Prompt:              | The child responds immediately, "The one under Curious George," but engages in inappropriate laughing.       |
| The confirmation:        | The child does not read a book.                                                                              |
|                          |                                                                                                              |
| 2. The Initiation:       | The child reaches for a puzzle.                                                                              |
| The Elaboration Request: | The teacher places her hand over the child's hand and asks, "Is the puzzle on the shelf or under the shelf?" |
| The Prompt:              | The child responds immediately, "It's on the shelf," but engages in inappropriate laughing.                  |
| The confirmation:        | The child does not do the puzzle.                                                                            |
|                          |                                                                                                              |
| 3. The Initiation:       | The child reaches for a bag of chips.                                                                        |
| The Elaboration Request: | The teacher places her hand over the child's hand and asks, "What's on top of the chips?"                    |
| The Prompt:              | The child responds immediately, "The pretzels are on top of the chips," but engages in a darting response.   |
| The confirmation:        | The child does not eat the chips.                                                                            |
-

## Appendix B

Written Examples of Incidental Teaching that Pertain to Use of Number Adjectives

## TRAINING - DAY 1

1. **The Initiation:** The child reaches for two trains.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "How many trains do you want?"
- The Prompt:** The child does not respond, so the teacher says, "Say, two trains". The child responds to this prompt.
- The confirmation:** The teacher gives two trains to the child and says, "Good, you said 'two trains'."
2. **The Initiation:** The child says, "I want cars."
- The Elaboration Request:** The teacher asks, "How many cars do you want?"
- The Prompt:** The child responds incorrectly. The teacher prompts, "I want three cars." "How many cars do you want?" The child responds to this prompt.
- The confirmation:** The teacher gives three cars to the child and says, "Great, you said 'three cars'."

---

(appendix continues)

Appendix B (continued)

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3. The Initiation: The child points to the cups.
- The Elaboration Request: Teacher asks "How many cups do you want?"
- The Prompt: The child responds immediately and says, "one cup."
- The confirmation: The teacher hands the cup to the child and says, "Good, you told me 'one cup'."
- 
4. The Initiation: The child looks at the bean bags and says, "bean bags."
- The Elaboration Request: The teacher says, "Say, 'I need three bean bags'."
- The Prompt: The child quickly approximates "I need three bean bags".
- The confirmation: The teacher gives three bean bags to the child and says, "Wonderful, you said 'I need three bean bags'."
- 

(appendix continues)

Appendix B (continued)

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5. **The Initiation:** The child arranges the chairs for musical chairs.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "How many chairs do you need?"
- The Prompt:** The child responds immediately, "Three chairs".
- The confirmation:** The teacher allows the child to continue arranging the chairs, and says, "Great, you said 'three chairs'."
6. **The Initiation:** The child says "Lets be in a marching band," and reaches for the musical instruments to distribute to his peers.
- The Elaboration Request:** The teacher asks, "How many instruments do you need?"
- The Prompt:** The child does not respond, and the teacher prompts, "Say, 'two instruments'." The child responds to this prompt.
- The confirmation:** The teacher gives two instruments to the child and says, "Wonderful, you told me you wanted two instruments'."
- 

(appendix continues)

Appendix B (continued)

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TRAINING - DAY 2

1. The Initiation: The child reaches for two blocks.
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "How many blocks do you want?"
- The Prompt: The child does not respond, so the teacher says, "Say, two blocks". The child responds to this prompt.
- The confirmation: The teacher gives two blocks to the child and says, "Good, you said 'two blocks'."
2. The Initiation: The child says, "I want to do a puzzle"
- The Elaboration Request: The teacher asks, "How many puzzles do you want?"
- The Prompt: The child responds incorrectly. The teacher prompts, "I want one puzzle." "How many puzzles do you want?" The child responds to this prompt.
- The confirmation: The teacher gives the puzzle to the child and says, "Great, you said 'one puzzle'."
- 

(appendix continues)

Appendix B (continued)

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3. **The Initiation:** The child points to the napkins
- The Elaboration Request:** Teacher asks "How many napkins do you need?"
- The Prompt:** The child responds immediately and says, "one napkin."
- The confirmation:** The teacher hands the napkin to the child and says, "Good, you told me 'one napkin'."
- 
4. **The Initiation:** The child reaches for the hot potato and says, "hot potato."
- The Elaboration Request:** The teacher says, "Say, 'I need only one hot potato'."
- The Prompt:** The child quickly approximates "I need one hot potato".
- The confirmation:** The teacher gives the potato to the child and says, "Wonderful, you said 'I need one hot potato'."
- 

(appendix continues)

Appendix B (continued)

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5. The Initiation: The child takes four pretzels from the snack container.
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "How many pretzels are you going to eat?"
- The Prompt: The child responds immediately, "Four pretzels!"
- The confirmation: The teacher allows the child to continue and says, "Good, you said four pretzels."

TRAINING - DAY 3

1. The Initiation: The child reaches for a chair to watch TV
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "How many chairs do you need?"
- The Prompt: The child does not respond, so the teacher says, "Say, only one chair". The child responds to this prompt.
- The confirmation: The teacher gives the chair to the child and says, "Good, you said 'one chair'."

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(appendix continues)

Appendix B (continued)

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2. The Initiation: The child says, "I want to eat chips."
- The Elaboration Request: The teacher asks, "Do you want one or two chips?"
- The Prompt: The child responds incorrectly. The teacher prompts, "I want two chips." "How many chips do you want?" The child responds to this prompt.
- The confirmation: The teacher gives two chips to the child and says, "Great, you said 'two chips'."
3. The Initiation: The child takes a plate.
- The Elaboration Request: Teacher asks "How many plates are you getting?"
- The Prompt: The child responds immediately and says, "one plate."
- The confirmation: The teacher hands the plate to the child and says, "Good, you told me 'one plate'."
- 

(appendix continues)

Appendix B (continued)

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4. The Initiation: The child takes three bean bags.
- The Elaboration Request: The teacher says, "Say, 'I am getting three bean bags'."
- The Prompt: The child quickly approximates "I am getting three bean bags".
- The confirmation: The teacher gives three bean bags to the child and says, "Wonderful, you said 'I am getting three bean bags.'"

TRAINING - DAY 4

1. The Initiation: The child reaches for two books.
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "How many books are you going to read?"
- The Prompt: The child does not respond, so the teacher says, "Say, I am going to read these two books". The child responds to this prompt.
- The confirmation: The teacher gives two books to the child and says, "Good, you said 'you are going to read these two books.'"

---

(appendix continues)

## Appendix B (continued)

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2. The Initiation:	The child reaches for a cup for water
The Elaboration Request:	The teacher asks, "How many cups do you need?"
The Prompt:	The child responds incorrectly. The teacher prompts, "I only need one cup." "How many cups do you need?" The child responds to this prompt.
The confirmation:	The teacher gives the cup to the child and says, "Great, you said 'I need only one cup'."
3. The Initiation:	The child takes out three musical instruments.
The Elaboration Request:	Teacher asks "Do you need two or three instruments?"
The Prompt:	The child responds immediately and says, "I need three."
The confirmation:	The teacher hands three instruments to the child and says, "Good, you told me you need three instruments."

---

(appendix continues)

Appendix B (continued)

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**TRAINING - DAY 5**

1. **The Initiation:** The child arranges the chairs for musical chairs.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "How many chairs do you need?"
- The Prompt:** The child responds immediately, but engages in an inappropriate vocalization (scream).
- The confirmation:** The child is not allowed to continue to arrange the chairs, and does not get to play musical chairs
2. **The Initiation:** The child takes three pretzels from the snack container.
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "How many pretzels are you going to eat?"
- The Prompt:** The child responds immediately, but engages in an inappropriate vocalization (scream).
- The confirmation:** The child does not eat the pretzels.
- 

(appendix continues)

**Appendix B (continued)**

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<b>3. The Initiation:</b>	<b>The child takes one train</b>
<b>The Elaboration Request:</b>	<b>The teacher places her hand over the child's hand and asks, "Do you have one or two trains?"</b>
<b>The Prompt:</b>	<b>The child responds immediately. "One train," but engages in inappropriate facial expressions.</b>
<b>The confirmation:</b>	<b>The child does not play with the train.</b>

---

## Appendix C

Written Examples of Incidental Teaching that Pertain to Use of Size Adjectives

## TRAINING - DAY 1

1. The Initiation: The child reaches for a cup  
(in the presence of a big and little cup.)
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "Which cup do you want?"
- The Prompt: The child does not respond, so the teacher says, "Say, the big cup". The child responds to this prompt.
- The confirmation: The teacher gives the big cup to the child and says, "Good, you said 'the big cup'."
2. The Initiation: The child says, "I want chalk"  
(in the presence of a big and little chalk.)
- The Elaboration Request: The teacher asks, "Do you want the big chalk or the little chalk?"
- The Prompt: The child responds incorrectly. The teacher prompts, "I want the big chalk." "Which chalk do you want?" The child responds to this prompt.
- The confirmation: The teacher gives the big chalk to the child and says, "Great, you said 'the big chalk'."

---

(appendix continues)

## Appendix C (continued)

- 
3. **The Initiation:** The child points to the puzzle  
(in the presence of a big and little puzzle.)
- The Elaboration Request:** Teacher asks "Which puzzle are you pointing to?"
- The Prompt:** The child responds immediately and says, "the little puzzle."
- The confirmation:** The teacher hands the little puzzle to the child and says, "Good, you told me 'the little puzzle'."
4. **The Initiation:** The child says, "I want peanut butter and jelly."
- The Elaboration Request:** The teacher says, "Do you want a big piece or a little piece?"
- The Prompt:** The child quickly says, "a little piece".
- The confirmation:** The teacher gives the little piece to the child and says, "Wonderful, you said 'the little piece'."
5. **The Initiation:** The child picks a big book to read  
(in the presence of a little book.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "What size book are you getting?"
- The Prompt:** The child responds immediately "a big book."
- The confirmation:** The teacher allows the child to continue and says, "Wonderful, you said 'a big book'."
- 

(appendix continues)

Appendix C (continued)

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6. **The Initiation:** The child takes the magnetic doll house  
(in the presence of a big and little dollhouse.)
- The Elaboration Request:** The teacher asks, "Which dollhouse are you taking?"
- The Prompt:** The child does not respond, and the teacher prompts, "Say, 'the big doll house'." The child responds to this prompt.
- The confirmation:** The teacher gives the big doll house to the child and says, "Wonderful, you told me the big doll house'."

TRAINING - DAY 2

1. **The Initiation:** The child reaches for a napkin  
(in the presence of a big and little napkin.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Which napkin do you want?"
- The Prompt:** The child does not respond, so the teacher says, "Say, the little napkin". The child responds to this prompt.
- The confirmation:** The teacher gives the little napkin to the child and says, "Good, you said 'the little napkin.'"

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(appendix continues)

Appendix C (continued)

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2. The Initiation: The child says, "I want chalk"  
(in the presence of big and little chalk.)
- The Elaboration Request: The teacher asks, "What size chalk do you want?"
- The Prompt: The child responds incorrectly. The teacher prompts, "I want the little chalk." "What size chalk do you want?" The child responds to this prompt.
- The confirmation: The teacher gives the little chalk to the child and says, "Great, you said 'the little chalk'."
3. The Initiation: The child points to the doll's shoes  
(in the presence of big and little shoes.)
- The Elaboration Request: Teacher asks "What shoes are you pointing to?"
- The Prompt: The child says, "the little shoes."
- The confirmation: The teacher hands the little shoes to the child and says, "Good, you told me 'the little shoes'."
4. The Initiation: The child reaches toward a doll.  
(in the presence of a big and little doll.)
- The Elaboration Request: The teacher places her hand over the child's hand and says, "Is the doll big or little?"
- The Prompt: The child quickly says, "Little."
- The confirmation: The teacher allows the child to continue and says, "Wonderful, you said little."
- 

(appendix continues)

Appendix C (continued)

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5. **The Initiation:** The child chooses a book to read with the teacher (in the presence of big and little books.)
- The Elaboration Request:** The teacher asks, "What size book did you get?"
- The Prompt:** The child does not respond, and the teacher prompts, "Say, 'a little book'." The child responds to this prompt.
- The confirmation:** The teacher allows the child to read the little book and says, "Wonderful, you told me 'a little book'."

TRAINING - DAY 3

1. **The Initiation:** The child reaches for a piece of her sandwich (in the presence of big and little pieces.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "What size piece are you eating?"
- The Prompt:** The child does not respond, so the teacher says, "Say, the little piece". The child responds to this prompt.
- The confirmation:** The teacher allows the child to continue and says, "Good, you said 'the little piece.'"
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Appendix C (continued)

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2. **The Initiation:** The child says, "I want the blocks"  
(in the presence of big and little blocks.)
- The Elaboration Request:** The teacher asks, "What size blocks do you want?"
- The Prompt:** The child responds incorrectly. The teacher prompts, "The little blocks." "What size blocks do you want?" The child responds to this prompt.
- The confirmation:** The teacher gives the little blocks to the child and says, "Great, you said 'the little blocks'."
3. **The Initiation:** The child points to the doll's short dress  
(in the presence of short and long dresses.)
- The Elaboration Request:** Teacher asks "What are you going to put on Barbie?"
- The Prompt:** The child responds, "the little dress."
- The confirmation:** The teacher hands the little dress to the child and says, "Good, you told me 'the little dress'."
4. **The Initiation:** The child takes the big doll  
(in the presence of big and little dolls.)
- The Elaboration Request:** The teacher says, "Is the doll big or little?"
- The Prompt:** The child quickly says, "She's big!"
- The confirmation:** The teacher allows the child to continue and says, "Wonderful, you said 'she's big'."
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## Appendix C (continued)

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 TRAINING - DAY 4

1. The Initiation: The child reaches for a reader  
(in the presence of big and little readers.)
- The Elaboration Request: The teacher places her hand over the child's hand and asks, "What size book are we going to read today?"
- The Prompt: The child does not respond, so the teacher says, "Say, the little book". The child responds to this prompt.
- The confirmation: The teacher gives the little book to the child and says, "Good, you said 'the little book.'"
2. The Initiation: The child reaches for a piece of her sandwich.
- The Elaboration Request: The teacher asks, "Do you want a big piece or a little piece?"
- The Prompt: The child responds incorrectly. The teacher prompts, "I want a big piece." "Do you want a big piece or a little piece?" The child responds to this prompt.
- The confirmation: The teacher gives the big piece to the child and says, "Great, you said 'a big piece'."
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Appendix C (continued)

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3. **The Initiation:** The child takes the doll's long dress  
(in the presence of a short and long dress.)
- The Elaboration Request:** Teacher asks "What are you going to put on Barbie?"
- The Prompt:** The child responds immediately and says, "the big dress."
- The confirmation:** The teacher hands the dress to the child and says, "Good, you told me 'the big dress'."

TRAINING - DAY 5

1. **The Initiation:** The child gets a doll to play with (in the presence of big and little dolls.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "What size doll are you getting?"
- The Prompt:** The child responds immediately "the little doll," but engages in perseverative hand movement.
- The confirmation:** The child is not given the doll.

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## Appendix C (continued)

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2. **The Initiation:** The child chooses a book to read  
(in the presence of big and little books.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Are you getting a big book or a little book?"
- The Prompt:** The child responds immediately "a little book," but engages in perseverative hand movement.
- The confirmation:** The child is not given the book to read.
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3. **The Initiation:** The child takes a chip  
(in the presence of big and little chips.)
- The Elaboration Request:** The teacher places her hand over the child's hand and asks, "Is your chip little or big?"
- The Prompt:** The child responds immediately "its big," but engages in noncontextual laughing.
- The confirmation:** The child is not given the chip.
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Appendix D

A Review of the Literature on the Effects of Self Recording on the Performance of Staff  
Working with Individuals with Developmental Disabilities.

The Effects of Self-Recording  
on the Performance of Staff Working with Individuals with  
Developmental Disabilities

by

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Queens College and The Graduate School  
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**Appendix D (continued)**

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**Abstract**

This paper is a review of the literature on the effects of self recording on the performance of staff working with individuals with developmental disabilities. The following factors have been found to affect self-recorded performance: (a) the obtrusiveness of the recording device; (b) comments to others during the self-recording period; (c) the desirability of the behavior targeted for change; (d) performance standards; (e) the time of self recording; and (f) other experimental manipulations. The literature also suggests that there are often large discrepancies between the records of self recorders and external agents. In addition, some researchers have attempted to assess the maintenance or generalization of self-recorded behavior over time and across settings. The implications of their findings will be discussed.

by

Susan M. Vener

Adviser: Professor Claire L. Poulson

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## Appendix D (continued)

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**The Effects of Self Recording on the Performance of  
Staff Working with Individuals with Developmental Disabilities**

Extensive supervisory involvement is required in managing the performance of staff working with individuals with developmental delays. Such involvement often requires that feedback contingent on their performance be provided to staff. Such feedback might take many forms, such as verbal praise (Burg, Reid, & Lattimore, 1979), verbal feedback, written feedback, posted feedback, behavioral lotteries, and group contingencies (Burgio, Whitman, & Reid, 1983).

For the most part, feedback is arranged and delivered by external agents (e.g., supervisors, consultants, directors, and administrators). Kazdin (cited in Rosenbaum & Drabman, 1979) discussed two limitations of feedback from external agents: (a) appropriate and inappropriate behavior may be unnoticed by external agents; and (b) the behavior of external agents may become prompts for the occurrence of specific responses. A staff member's performance may change considerably in the absence or the presence of a trainer; and (c) it may be difficult to generalize skills acquired under external monitoring to situations in which the external monitor is absent. Burg et al. (1979) discussed the following additional difficulties associated with relying on external agents to provide feedback to staff: (a) the reluctance of administrative staff to accept new procedures; and (b) the expense. Relying on external agents requires that supervisors be available to observe and collect data on staff performance for extended lengths of time.

Staff members can learn to evaluate their own performance and to administer the appropriate contingencies. Staff may be the most effective agents for affecting behavior change because (a) they have continuous access to their own behavior, and (b) they may

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## Appendix D (continued)

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be able to acquire a set of skills that will generalize to new situations (Burgio et al., 1983). Less time and involvement may be required of supervisors if staff could acquire skills, such as self recording, that would enable them to manage their own behavior while working with clients with developmental delays.

Self recording involves systematically observing one's own behavior and responding to the occurrence of a specified target response (Cooper, Heron, & Heward, 1987). Staff observe whether a specific response has occurred, focus on features of their own behavior, and recognize the antecedent stimuli and response consequences associated with these responses (Kanfer, 1970). Self observation heightens an individual's awareness of the targeted behavior (Nelson, Lipinski, & Black, 1976).

Self recording also requires staff to objectively record some aspect of behavior (e.g., frequency; rate; or duration). Self recording is effective in providing the individual with data on the occurrence of a behavior, and on establishing a self-observing response (Kanfer, 1970; Lee, 1989).

Few studies have addressed the issue of whether self recording is more effective than recording by an external observer in affecting behavior change. For those that have been conducted, the results of the studies have been mixed.

Kazdin (1974) investigated the effects of self recording and external observations on the number of self-reference statements (e.g., "I"; "We") made by undergraduate students during a 20 minute conversation. Undergraduate students were divided into two groups. One group was instructed to use a digital counter to record the number of self-reference statements. The other group was informed that the experimenter would count the number of statements. The author found self recording and recording by another

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## Appendix D (continued)

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person equally effective in increasing the use of pronouns during a sentence construction task.

Similarly, Cavior and Marabotto (1976) investigated the effects of self recording and recording by an external observer on appropriate and inappropriate verbal responses. Undergraduate students in one group self recorded their verbal behavior during a 15 minute conversation. The other group was reminded that an external observer would record verbal behavior. The authors found self recording and recording by another person equally effective in increasing appropriate verbal responses and decreasing inappropriate verbal responses.

The results from Kazdin (1974) and Cavior et al. (1976) suggest that the two types of observing were equally effective in affecting behavior change. Behavioral changes that accompanied self and external recordings were probably due to the act of being observed, and not due to the manner in which the measures were collected.

The following researchers did not find self recording and recording by an external agent equally effective in affecting behavior change. Nelson, Lipinski, and Black (1976) investigated the effect of external observations and self recording on face touching behavior in 14 college students. The authors found self recording more effective than recording by another person in decreasing the amount of face touching of the students.

Similarly, Maletzky (1974) investigated the effect of self recording and recording by an external agent on scratching, nail biting, and repeatedly raising one's hand in class. The results showed that self recording resulted in a significantly greater decrease in the behavior than recording by an external agent.

Extending the findings of Nelson, Lipinski, and Black (1976) and Maletzky

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(1974), Hallahan, Lloyd, Kneedler, & Marshall (1982) investigated the effect of self recording and external observation on on-task behavior and academic productivity in children with learning disabilities. The authors found that although both self recording and recording by another person resulted in increased on-task responses and number of arithmetic problems completed by the children, the effects were greater when the children recorded their own responses.

The results from Nelson et al. (1976), Maletzky (1974), and Hallahan et al. (1982) suggest that although both self recording and recording by an external agent resulted in behavior change, the effects were greater when the subjects recorded their own behavior.

The above studies (Kazdin, 1974; Cavior and Marabotto, 1976; Nelson, et al., 1976; Maletsky, 1974; and Hallahan et al., 1982) demonstrated behavior change regardless of whether behavior was self recorded or recorded by an external agent. Self recording was found to be as effective as, or more effective than external monitoring in affecting behavior change.

### Reactivity of Self Recording

Self recording could be thought of as a method for collecting data on behavior that only the subject could observe and record. It would be then assumed that the observation of one's own behavior has little or no effect on the target behavior. However, self recording itself has become an effective intervention. The process of observing and recording one's own behavior may produce a behavior change. The tendency for behavior to change as a function of self recording is known as reactivity (Kirby, Fowler, & Baer, 1991). Reactivity refers to the effect of the assessment procedure on the subject's performance (Kazdin, 1997).

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Typically, during baseline conditions, observations are made without the knowledge of the subjects or at least without their awareness of the behavior being observed. Nevertheless, during treatment, staff often become aware of the behavior under observation. Thus, it is possible that staff's awareness of being observed and the presence of the observer do more to change the behavior than the intervention itself (Johnson, 1971; and Simkins, 1971).

The self-recording studies have shown that in those instances in which self recording has resulted in behavioral changes, the changes have been in a desired direction. Richman, Riordan, Reiss, Pyles, and Bailey (1988) taught staff to self record on-task behavior, and as a result, staff on-task behavior increased. Burg, Reid, and Lattimore (1979), and Burgio et al. (1983), taught staff to self record staff-to-staff interactions and interactions with clients with severe and profound mental retardation. Results showed that the number of staff-client and staff-staff interactions increased. Kissel, Whitman and Reid (1983) taught staff to train clients to brush their teeth, and to self record their own training behavior. Results showed that client toothbrushing performance improved and staff successfully implemented training techniques. Herbert and Baer (1972) trained parents to self record parent attention to appropriate child behavior, such as following instructions and talking to other children. Parent attention to appropriate child behavior increased and child behavior improved. Vener, Poulson, and Rousseau (1994) investigated the effect of self recording on graduate student interactions with day treatment center staff and clients, and on graduate student data recording skills. The results showed that self recording improved social interactions and data recording skills.

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Ackley and Bailey (1995) used a self-recording procedure to improve the productivity of a secretary in a legal firm. The authors developed a checklist specifying the tasks to be completed and the criteria for their completion. During baseline, observers recorded the occurrence or nonoccurrence of the checklist responses. During treatment, the secretary completed the checklist, thereby recording her own performance. At the end of the day, the authors reviewed and graphed the data with the secretary. The results showed that the secretary's productivity increased when self recording and graphing was introduced.

The following variables may play a part in the reactivity of self recording and will be discussed: (a) the obtrusiveness of the recording device itself; (b) comments to others during the self-recording period; (c) the desirability of the behavior targeted to be self recorded; (d) performance standards; (e) the time the self recording occurs; and (f) other variables influencing self recording.

(a) The Obtrusiveness of the Recording Device itself

During behavioral observation sessions, subjects may, in varying degrees, be aware that assessment is going on (Kazdin, 1979). Research on the obtrusiveness of the recording device itself has been inconclusive. Nelson, Lipinski, and Boykin (1978) used self recording to increase appropriate classroom verbalizations in adolescents with mild and moderate mental retardation. They investigated the effect of less obtrusive belt-worn counters and more obtrusive hand-held counters on increasing verbal behavior. Although both types of self recording produced changes in appropriate verbalizations, the hand-held counter tended to produce a higher frequency of appropriate verbalizations and more accurate self recording.

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Similarly, a study by Kirby, Fowler, and Baer (1991) examined the effect of two types of self-recording devices on the number of math questions completed for 19 first-grade public school children. The devices were a less obtrusive gridded page kept inside the desk except during self recording and a more obtrusive grid kept on top of the desk. The results showed that children's performances did not increase when either self-recording device was introduced. However, performance did improve in the presence of the more obtrusive self-recording device when the children were given the instruction to "try to beat their best score". These results indicate that the obtrusiveness of the self-recording device may influence behavior only when other variables, such as qualitative instructions from a therapist are involved.

One possible way to minimize the influence of device obtrusiveness is to have the device(s) present during baseline. The researcher may have staff collect performance data using the device(s) during baseline on an entirely different behavior than during treatment. In this way, the influence of the obtrusiveness of the device may be reduced, and the researcher could then study the effects of other variables.

### (b) Comments to Others During the Self-Recording Period

Kirby et al.(1991) systematically investigated the effect of peer comments on self-recorded performance. Four second-grade children were instructed to self record performance during math class and to self record performance during an alphabet task. At times, these children were encouraged to talk to peers during the math task, and were discouraged to talk during the alphabet task. At other times, these children were encouraged to talk to peers during the alphabet task and were discouraged to talk during the math task.

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The results showed that the children's self recorded math performance improved during periods when they were encouraged to speak to their peers. However, when the children were encouraged to speak to their peers during the alphabet task, there was no improvement in their task performance. The results were inconclusive. More research is needed to clarify the influence of subject verbalizations on self-recorded performance.

### (c) The Desirability of the Response Targeted to be Self Recorded

Another factor that has been found to influence the reactivity of self recording is the desirability of the response targeted to be observed. Kanfer (1970) stated that instructions, or the way in which instructions are presented to subjects, can effect performance. He suggested that if instructions imply that a response is undesirable, that response will tend to decrease. If the instructions imply that a response is desirable, that response will tend to increase.

The following studies were designed to investigate the effect of behavior desirability on the direction of behavior change. Kazdin (1974) instructed undergraduate students to self record their verbal behavior, and told students that either: (1) intelligent and creative students begin many sentences with "I" or "we" (positive); (2) less intelligent and less creative students begin sentences with "I" and "we" (negative); or (3) nothing about self-reference statements. The results showed that when students were told that self-reference statements were desirable, their number of self-reference statements increased. When students were told that self-reference statements were undesirable, their number of self-reference statements decreased. For those students who were not given an indication of whether the use of pronouns was positive or negative, the number of self-reference statements increased only slightly. This infers that the desirability of the

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targeted response affected the direction of behavior change.

Similarly, Maletzky (1974) investigated the effect of behavior desirability on behavior change. Adult patients were instructed that counting their responses (e.g., the number of repetitive scratching responses) would assist the therapists in understanding their problems, but that counting would not necessarily decrease unwanted responses. Results showed that merely tracking one's own progress resulted in a decrease in the unwanted motor responses.

Finally, Cavior and Marabotto (1976) investigated the effect of behavior desirability on the direction of behavior change. The authors instructed undergraduate and graduate students to observe a videotaped conversation among themselves. While viewing the videotape, the researcher identified the students verbal responses as "positive", "negative", or "neutral". Following the observation of the videotape, the students were instructed to engage in a 15 minute conversation with each other. Some students were instructed to self record positive statements, others were told to self record negative verbal statements, and others were informed that an external agent would monitor verbal behavior. The results showed that when the targeted responses were "positive", self recording and recording by an external agent resulted in increases in positive responses. When the targeted responses were "negative", both self recording and recording by an external agent resulted in decreases in the targeted responses.

The results from Kanfer (1970), Kazdin (1974), Maletzky (1974) and Cavior et al. (1976) suggest that the desirability of the targeted behavior affects behavior change. Desirability is a necessary condition for influencing the direction of behavior change. However, the desirability of the behavior itself is not a sufficient condition for behavior

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change. Kazdin (1974) stated that simply knowing that a particular response may be undesirable (e.g., excessive alcohol consumption) is not an effective deterrent in its own right. Only when the individual self records the occurrence of the behavior (e.g., the number of drinks consumed), may that behavior change.

### (d) Performance Standards

Another factor found to influence self-recorded performance is a self recorder's awareness of whether his or her performance differs from that which is socially or personally acceptable (Kazdin, 1974). When an individual is given information regarding the extent to which his performance deviates from the standard, that individual can: (1) view his performance as unacceptable and work toward improving it; (2) view his performance as satisfactory and work toward maintaining it at current levels; (3) view his performance with disinterest and thereby effectuating no change in his performance (Locke, Cartledge, & Koepfel, 1963); or (4) view his performance as satisfactory and work toward surpassing his peers.

Kazdin (1974) investigated whether setting a standard for good performance prior to beginning a session affects self recorded verbal performance. Undergraduate students were instructed to self record verbal statements involving the use of a pronoun. Some participants were told that 35-40 statements was desirable performance. Other participants were not provided with a performance standard. The results showed that participants who were provided with a performance standard responded with more target pronouns than those who did not receive a performance standard.

### (e) The Time the Self Recording Occurs

Another factor that has been found to influence self-recorded performance is the

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time of the self recording. Self observations can be made prior to, during, or following a targeted response. Kanfer (1970) suggested that when the response to be observed precedes an undesirable response (e.g., a walk to a bar precedes a drink at the bar), and the response to be observed is self recorded, the act of self recording functions as a disruption of the sequence. The chain of responses has thus been disrupted and the negative response might not occur. Kazdin (1974) used another example to further explain this theory. When an individual is self recording sexual thoughts, the act of obtaining a diary and entering data into the diary can interrupt the arousal sequence, thereby terminating his sexual thoughts.

Bellack, Rosensky, and Schwartz (1974) investigated the effect of self recording on a weight-control program. Subjects were instructed to write down everything that they ate, the amount they ate, the time they ate, and the place they ate. One group self recorded prior to eating and the other group immediately after eating. Results from these two groups were compared to results from a control group that was not instructed to self record. The results showed that the most weight loss occurred in subjects that recorded behavior prior to eating. Self recording prior to actual eating served to interrupt the stimulus-response chain. The subject was presented with an alternate behavior, self recording. Self recording following actual eating did not interrupt the stimulus-response chain.

Similarly, Cavior et al. (1976) investigated the influence of the time of self recording on behavior change. Undergraduate students initially observed their own verbal behavior by viewing a videotape of their performance. Following this observation of the tape, subjects were instructed to engage in a 15 minute conversation with a peer.

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Some subjects self recorded their positive or negative verbal statements during the videotaped session and not during the following conversation session. Other subjects were told to self record their positive or negative verbal statements during the 15 minute conversation period and not during the videotaped session. The statements of the remaining subjects were monitored by an external agent throughout the study. The results showed that self recording while watching the videotaped session significantly reduced "negative" verbal behavior during the 15 minute conversation period which followed more than either self recording or recording by an external agent during the 15 minute conversation. Self recording while watching the videotaped session was found to be less effective in increasing "positive" verbal behavior during the 15 minute conversation period than self recording or recording by an external agent during the conversation period. These results suggest that the time that one self records does have an effect on behavior. It also suggests that the time of self recording is affected by the desirability of the behavior.

### (f) Other Variables Influencing Self Recording

Self recording is often part of a treatment package. The following study is an example of self-recording treatment confounded by other variables. Johnson, Welsh, Miller, and Altus (1991) developed a self-report checklist for staff. Staff were required to record their own work performance by marking each task at the end of the week as complete or not complete. Staff: (1) earned worksharing credits for work completed; (2) could be fined for work not completed; and (3) were given written feedback on their checklist for any discrepancies between the self report and the observations of a supervisor. The results showed that the percentage of staff tasks completed was

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considerably higher when self recording and consequences for self-recorded performance were in effect. Although the treatment package was effective in increasing targeted performance, it is not possible to evaluate the effects of its components. However, the relative importance of the components does not lessen the effectiveness of the entire treatment program. Additional research is indicated for component analyses.

### Assessing Recorded Performance

By systematically collecting data on one's own behavior, staff can assess any change in his/her own performance. A staff member may examine his/her own behavior and decide whether he or she has successfully performed a specific behavior or class of behavior (Glynn, 1973). Knowledge of one's own performance can have important behavioral effects (Johnson & White, 1971). Evaluating one's own performance may serve to reinforce or to punish the observed behavior, and affect its future probability of occurrence.

Although self recording has been found to increase desirable behavior, data collected by self recorders may be inaccurate (Lee & Piersel, 1989; Nelson, Lipinski, & Black, 1975; Romanczyk, Kent, Diament, & O'Leary, 1973; Simkins, 1971). Low correlations have been found between the records of self recorders and independent observers. In one study, it was shown that when self recorders were aware that the reliability of their recordings was being assessed, reliability increased substantially (Romanczyk, 1973). In a study by Nelson, et al. (1975), 20 college students were trained to self record face-touching responses. Results indicated that subject recordings were less reliable when subjects were unaware that their behavior was being assessed and were more reliable when they were aware of being assessed.

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Discrepancies between the records of self recorders and external agents may be the result of: (a) different criteria between self recorders and external agents; (b) an incident that occurred that prevented the subject from self recording; and (c) any other stimuli that might interrupt the act of self recording (Simkins, 1971).

A factor that appears to influence the accuracy of self recording is the use of the self-reported scores as a basis for reinforcement. Hundert and Bucher (1978) reported that students who previously had self recorded the number of accurately completed arithmetic assignments, exaggerated their numbers when higher numbers resulted in prizes. These findings suggest that when self-recorded scores resulted in self-administered reinforcement, the accuracy of self recording decreased.

Rewarding children for producing accurate self-recorded data is a procedure that has been used to increase the accuracy of self recording by young children. Hundert et al. (1978) gave bonus points for self-recorded scores that matched the teacher's score, and took away points that differed from the teacher's score. This procedure greatly reduced exaggerated scores.

Spot Checking is another procedure that has been used to increase the accuracy of self-recording. Hundert et al. (1978) randomly selected one student each day and checked the accuracy of self-reported scores on arithmetic assignments. This procedure greatly reduced exaggerated scores.

Accuracy of self recording may be effected by the difficulty of the task. Peacock, Lyman, and Rickard (1978) examined the effect of self recording on room cleaning behavior. The authors found that when the adolescent boys were reinforced for accurately recording performance for easy tasks, both accuracy and work performance efficiency

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increased. When the boys were reinforced for accuracy for hard tasks, although accuracy increased, work performance efficiency did not.

Many self-recording studies have not dealt with consequences for incorrect recording. Several authors stated that inaccuracies were ignored (e.g., Ballard and Glynn, 1975; Burg et al., 1979; Burgio et al. 1983); other studies did not address the accuracy of recording at all (e.g., DiGangi, Maag, & Rutherford, 1991; Harris, 1986; Ninness, Fuerst, Rutherford, and Glenn, 1991; and Winett, Neale, & Grier, 1979). Relatively few studies have included correction for inaccuracy (e.g., Richman et al., 1988; and Koegel, Koegel, Voy, and Inghamn, 1988). It is interesting to note that desired behavioral changes have been found to occur regardless of inaccurate self recording.

Although accuracy in self recording is desirable, it is not a sufficient or even necessary condition for behavior change (Cooper, Heron, & Heward, 1987). Several studies have found little correlation between the accuracy of self recording and its effectiveness in changing the targeted behavior. Hundert and Bucher (1978) found that even though the students learned to accurately self record their performance on arithmetic assignments, their performance in the arithmetic itself did not improve. On the other hand, in the Broden, Hall, and Mitts (1971) study, neither student recorded accurately, yet both students' study behavior improved. Kneedler and Hallahan (1981) also found that although a seven year old boy with attention difficulties did not record accurately, his on-task behavior improved.

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Self Recording to Promote the  
Maintenance and Generalization of Skills

The Maintenance and Generalization of Self-Recorded Behavior Over Time

Some researchers (Bellack et al. (1974), Romanczyk (1974), Maletzky (1974), Burg et al. (1979), and Burgio et al. (1983)) have investigated the maintenance or generalization of self-recorded behavior over time. Bellack et al. (1974) investigated the effect of self recording on eating prior to and following actual food consumption. During both the treatment period and at the end of a six week follow-up period, the authors found that self recording prior to eating was more effective in decreasing food consumption than self recording immediately following food consumption.

Similarly, Romanczyk (1974) investigated the effect of self recording on daily weight and daily caloric intake. The results showed that self recording daily weight was not effective in reducing weight. However, self recording caloric intake was effective in producing weight loss during treatment and maintaining weight loss at a 13 week follow-up.

Maletzky (1974) investigated the effect of self recording on scratching, excessive hand raising, and frequent out-of-seat behavior. The results showed that self recording: (a) decreased repetitive scratching in a 52 year old woman at the end of treatment and at the end of a 12-month follow-up period; (b) decreased excessive hand raising in a nine year old boy at the end of treatment and at the end of a six-month follow-up period; and (c) decreased frequent out-of-seat behavior in an 11 year old girl at the end of treatment and over a six-month follow-up.

Burg et al. (1979) investigated the effect of self recording on interactions between

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direct care staff and individuals with profound mental retardation in a residential facility. The results demonstrated that self recording was effective in increasing staff-resident interactions. In addition, the authors investigated the maintenance of treatment gains over time. Follow-up observations of these interactions were conducted seven and 11 weeks after the termination of self-recording. The results during follow-up observations were difficult to explain. Performance during the seven week follow-up was similar to performance during baseline. There were few interactions between staff and residents. Performance during the 11 week follow-up was similar to performance during self recording.

Finally, Burgio et al. (1983) investigated the effect of self recording and self graphing on the interactions between 10 institutional staff and 15 residents with severe and profound mental retardation. The results showed that self recording and self graphing were effective in increasing these interactions. Follow-up observations were then conducted over a six week period. During these observation sessions, self recording showed that the interactions between seven staff and residents either increased or maintained, and that interactions between three staff and residents decreased.

In some of the above studies, the follow-up measures were collected soon after the termination of treatment (e.g., Bellack et al., 1974 - six weeks after termination of treatment; Romanczyk, 1974 - 13 week follow-up, etc.). It is suggested that the effects of self recording on the maintenance and generalization of acquired skills across responses and settings be assessed at extended intervals of time.

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### The Maintenance and Generalization of Self-Recorded Behavior Across Responses

The following researchers, Kissel et al. (1983), Gajar, Schloss, Schloss, & Thompson (1984), and Schloss et al. (1990) investigated the effect of self recording across responses. Kissel et al. (1983) investigated the effect of self recording on staff training behavior and child self-care skills. Four direct care staff were trained on how to instruct, physically guide, and verbally reinforce toothbrushing responses in 12 individuals with severe to profound mental retardation. Staff were instructed to self record their own teaching behavior and the behavior of the children during the toothbrushing task. Staff were also instructed to self record their own teaching and the behavior of the children during a haircombing and handwashing task, even though they did not receive training on these behavior. The results showed that by self recording teaching behavior, staff effectively improved child toothbrushing. In addition, the effects of self recording on toothbrushing generalized to other self-care responses that were not directly trained. These authors successfully demonstrated the involvement of self recording in generalizing treatment gains across self-care responses with targeted individuals.

Extending the findings of Kissel et al. (1983), Gajar, Schloss, Schloss, & Thompson (1984) investigated the effect of self monitoring and verbal feedback on positive conversation behavior in two individuals with head trauma. The results showed that self recording and feedback were effective in increasing appropriate conversation behavior when the instructor selected the topic for discussion and lead the conversation. The improvement in conversation behavior also generalized to discussions in which the instructor did not identify the topic for discussion or lead the conversation.

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Finally, Schloss et al.(1990) found that modeling, performance feedback and self recording were effective in increasing (a) nondirected question asking (asking the group a question) (b) directed question asking (asking a particular person a question), and (c) directed question answering (answering a directed question), in two women with mild mental retardation. The results showed that the acquired skills generalized to the untrained behavior of answering nondirected questions (answering a question that was directed to the whole.

### The Maintenance and Generalization of Self-Recorded Behavior Across Settings

Other researchers investigated the effect of self recording across settings. Richman et al. (1988) investigated the effect of self recording on staff "on-schedule" and "on-task" behavior. "On-schedule" was defined as being in a predesignated location at a specific time. "On-task" was defined as working with appropriate materials or appropriately interacting with clients. The results demonstrated that self recording improved staff performance in both areas. In addition, researchers collected data on staff behavior during times when staff did not self record performance. The results showed that the effect of self recording staff "on-task" and "on-schedule" behavior generalized to times when self recording was not implemented.

Kelly et al.(1983) investigated the effect of verbal training, role-playing, and self recording on instruction-following in four adolescents in a residential facility. The results showed that the treatment package was effective in increasing instruction-following in the training setting and in a non-training setting.

Kiburz et al.(1984) found that modeling, role-playing, performance feedback, and self recording were effective in increasing social skills (e.g., greetings; salutations;

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initiating conversation) in an 18 year old woman with mild mental retardation. The results also showed that these acquired social skills generalized to other settings.

Warrenfeltz et al.(1981) found that verbal instructions, role-playing, and self recording were effective in increasing compliance in four adolescents in a residential facility. In addition, the effects generalized to the work setting.

The results of all of the above studies suggest that self recording is an effective procedure in promoting the generalization and maintenance of acquired skills over time, across responses, and across settings.

### Conclusion

In most educational centers, it is impractical to train staff to cope with each situation that arises. It would be too costly and too impractical a use of time. Staff need to acquire a set of skills that will enable them to become effective teachers and decision makers in a variety of situations and with a variety of individuals. Self recording can be quickly taught, is easily applied to many situations, and its effects have been found to generalize over time, across responses, and across settings.

When designing a study, researchers need to take into account variables that may play a part in the reactivity of the self-recording procedure. Self-recorded performance can be effected by: (a) the obtrusiveness of the recording device; (b) comments to others during the self-recording period; (c) the desirability of the behavior being measured; (d) performance standards; (e) the time of self-recording; and (f) other variables affecting self-recorded performance. By assessing the influence of these variables on behavior change, future researchers can design and implement studies that optimize the use of the self-recording procedure.

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