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Title: *The Effects of Practice-Based Coaching on the Implementation of Shared Book Reading Strategies for SLP-As and Paraeducators Working with Children with Language Delays*

Abstract

This study examined the effects of practice-based coaching with scripted supports designed to support paraeducators and speech-language pathology assistants (SLP-As) as they implement evidence-based shared book reading strategies with preschoolers with language delays. A single-case, multiple baseline across behaviors was employed. Five educators (three SLP-As and two paraeducators) participated in the study. The primary dependent variable was percentage of strategies correctly implemented; the secondary dependent variable was expressive and receptive vocabulary. Results demonstrate that all five educators were able to successfully implement the strategies with high and consistent levels of fidelity during the intervention and maintained similar levels of fidelity even after coaching and scripted supports were faded or removed. All five preschool participants showed gains in both expressive and receptive vocabulary. Social validity results support the feasibility and usefulness of the intervention. Implications for research and practice are provided.

Keywords

Professional development, paraeducators, speech-language pathology assistants, single-case design, literacy, preschool

Implementation Science Framework in EC

In the field of early intervention/early childhood special education (EI/ECSE), an important area of focus is identifying effective practices related to improved outcomes for children, including those with or at risk for disabilities and their families. Yet, a significant gap remains between research and practice in EI/ECSE (Hebbeler et al., 2012; Metz & Bartley, 2012). To work towards minimizing the research to practice gap, the factors that promote practitioners' use of effective interventions must be considered and defined.

Implementation science (IS) is the scientific study of the variables and conditions that impact the effectiveness and sustainability of evidence-based (EB) interventions, and could help close the research to practice gap (Fixsen et al., 2010). Using an IS framework, Fixsen and colleagues (2010) stressed the importance of enhancing and supporting teacher's use of interventions to yield positive outcomes for young children. However, equally important to effective implementation is the consideration of the barriers and facilitators for individual practitioners within "real world" settings. For instance, some interventions may be designed for small groups, but that service delivery model may not be possible for some practitioners. Similarly, there may be a gap in knowledge necessary for effective implementation. This may be particularly true for paraeducators and speech-language pathology assistants (SLP-As), who spend a substantial amount of direct time with children, yet often have less training (Every Student Succeeds Act [ESSA], Sec. 1013(c)(1)). As such, practitioners may need scaffolding to help bridge knowledge and utilization to promote implementation fidelity of a practice(s) (Sexton & Rush, 2021). Implementation fidelity is the degree to which an intervention is delivered as intended and is critical to successful translation of EB interventions into practice. Implementation guides could provide, in part, a key driver to the consistent and competent

implementation of EB practices as well as the necessary support for practitioners to apply content immediately after training to "hit the ground running." The immediacy of the practitioner's success may help with positive outcomes, earlier buy-in, and longer practice as they habituate (Sexton & Rush, 2021). Systematic professional development (PD) is one critical type of implementation support that increases the capacity of professionals to use an intervention (Odom et al., 2014). Several features are thought to support changes in practice across early childhood settings (a) explicit teaching of content, (b) frequent job-embedded opportunities to practice, multiple and multimodal opportunities for learners to reflect, (c) coaching on real-world practice with enough intensity to increase implementation, (d) and follow-up support to ensure lasting changes in practice (Snyder et al., 2011, 2012)

Virtual Delivery of PD

Practice-based coaching (PBC) is an approach that is robust, individualized, and supportive, yielding positive outcomes for EC teachers and children (Snyder et al., 2015). PBC is a cyclical process starting with collaborative partnerships, uses shared goals and action planning, focused observation, and reflection and feedback to improve effective teaching practices. The use of a workshop followed by PBC can increase teachers' use of embedded instruction (Snyder et al., 2015), literacy practices (Diamond & Powell, 2011), and social-emotional instruction (Artman-Meeker et al., 2014). There is evidence that PBC can be offered flexibly to meet individual and program needs. For example, PBC can be delivered live in the classroom or at a distance through technology. Researchers have used email (Baughan et al., 2019), video (McLeod et al., 2019), and web-based self-coaching (Snyder et al., 2018) to deliver PBC.

Vocabulary Instruction during Shared Book Reading (SBR)

Emergent literacy skills are strong predictors of later success in reading (Whitehurst & Lonigan, 1998). Oral language skills are predictive of reading comprehension later in life and preschool is a crucial time for children to develop oral language (Wasik & Iannone-Campbell, 2012). One way to measure children's oral language development is through their expressive and receptive understanding of vocabulary words; and research suggests children with language impairments are able to increase vocabulary knowledge during SBR (Storkel et al., 2017).

SBR is a common routine in most preschool classrooms. Through SBR, children can engage in conversations with adults and peers while hearing novel vocabulary words they may not encounter in typical conversations. Different styles of SBR exist, one being dialogic reading (DR); DR is an interactive, conversational style of SBR (Whitehurst & Lonigan, 1998). It includes a specific series of steps an adult can follow to scaffold interactions while reading to the child (PEER — Prompt, Evaluate, Expand, Repeat) as well as various prompts that are used to encourage practice with oral language (Zevenbergen & Whitehurst, 2003). This style of SBR has yielded positive effects on oral language development for typically developing preschool students (What Works Clearinghouse, 2007), and it also has "potentially positive effects" on the communication skills of children with or at-risk for disabilities (What Works Clearinghouse, 2010, p. 1). One way to improve implementation of DR strategies is intentional consideration for when and where to use the PEER sequence, such as using scripts (van Kleeck et al., 2006). Scripts can be personalized to meet the individualized needs of educators, detail the specific instruction, and ensure the intervention is natural and accessible (Author; Goldstein et al., 2016; van Kleeck et al., 2006). Toub et al. (2018) found positive results when presenting new vocabulary through book readings with scripted supports intended to enrich and elaborate on the

book's text and illustrations. In the current study, scripts are used as an implementation guide to support educators' acquisition and maintenance of taught strategies.

Paraeducators/SLP-As

Effective EC PD must be designed to address the unique contexts and professionals across the EC sector (Winton et al., 2015), including a range of education and certification levels (Artman-Meeker et al., 2014; Snyder et al., 2012). Paras and SLP-As play a vital role in the instruction of students with disabilities. In fact, there are more special education paraprofessionals employed in preschool through high school settings than special education teachers (U.S. Department of Education, 2017). Paras are employees who provide instructional support, assist with classroom management, and participate in parental involvement activities (U.S. Department of Education, 2017, p. 37). Similarly, SLP-As are support personnel who work with certified SLPs to engage in prevention activities, prepare for and implement treatment sessions, communicate with students and families, and perform administrative tasks (Council for Clinical Certification, 2020). Given the importance of paras and SLP-As in the education of students with disabilities, adequate preparation and training are critical for students to achieve the best outcomes (Brock & Carter, 2013; IDEA, 2004). The requirements for appropriate training vary by state and are often unclear (Hall & Odom, 2019). A small number of states have taken steps to ensure their paras are adequately prepared for their roles (e.g., Colorado, Virginia); however, there are lingering concerns over the preparation. For example, a large-scale, multi-site research study conducted in 26 schools across six states found that a common concern among teachers, parents, and administrators was paras' lack of training to work with students with disabilities (Giangreco et al., 2011). Similarly, there is variability across states regarding how SLP-As are trained and supervised (ASHA, n.d), including how many hours of PD is required

per year. In the most recent reporting, over 30 states have no requirements for continuing education of SLP-As in school settings. This is troublesome considering the varied child populations on SLPs' caseloads, and the need to implement EB approaches tailored to those children's needs. Taken together, is clear there is a need for a structured and supportive approach to providing robust PD to paras and SLP-As, who play an important role in the language and literacy acquisition of children with language delays.

Current Study

The purpose of this early efficacy study was to evaluate the effects of practice-based coaching (PBC) intended to increase paras and SLP-As use of explicit vocabulary instruction while reading to a preschool-aged child with a language delay. The following research questions were addressed: *Research Question 1*: Does PBC with scripted supports increase early childhood educators' fidelity related to explicit vocabulary instruction and shared book reading strategies when reading with a preschool child with a language delay? *Research Question 2*: Does early childhood educators' use of shared book reading with embedded explicit vocabulary instruction increase preschool children's vocabulary knowledge based on expressive and receptive vocabulary knowledge probes? *Research Question 3*: What are early childhood educators' perceptions of the quality and effectiveness of the PBC program?

Method

All aspects of this project were approved by the Internal Review Board at a university located in the southeastern United States.

Participants

Educators

Five educators (three SLP-As and two paras), from five different states participated in this study. All participants met the following inclusionary criteria: (a) currently working full-time in an educational setting in the United States with preschool-aged children at least 3 days per week, and (b) not currently enrolled in, nor planning to enroll in a graduate program. On average, the participants had 7 years of experience (range = 1-21) and managed caseloads of approximately 42 children (range = 19-100). See Table 1 for demographic information.

Children

Five preschool-aged children were selected from the caseloads or classrooms of consented educators. Information about the children was obtained through a parent questionnaire. Children ranged in age from 47 - 59 months (i.e., 3:11 years - 4:9 years), with 53 months being the average (4:4 years). Each of the five children had a current Individualized Education Plan (IEP) with at least one goal targeting language, as reported by the educator and confirmed by the parent. Three of the children were white/Caucasian, one was black, and one was both black and white/ Caucasian. Two of the children were female and three were male.

Setting

The setting for the intervention was determined by each educator, depending on available space and schedules. Educators were asked to read at approximately the same time as well as maintain consistency within the environment (e.g., similar seating and table arrangement). Coaches and educators communicated via email and/or text to schedule virtual, weekly coaching sessions at a time that was mutually convenient. Coaches and educators met via Zoom.

Materials

Coaching and implementation materials (except for storybooks mailed to each participant) were designed by the researchers; implementation materials were made accessible to

the educators via Google drive during weekly coaching sessions. Coaching materials included a performance feedback sheet (i.e., graph and summary of data) and action plan form (i.e., goal and associated actions). Implementation materials included: (a) age and developmentally appropriate storybooks, (b) scripted supports specific to each storybook (i.e., teacher worksheet), (c) iPad for use with receptive vocabulary probe (i.e., pictures) and for recording sessions and uploading to Vosaic, and (d) vocabulary probes (i.e., expressive and receptive; pre and posttest). Vocabulary targeted in the study met the following criteria: (a) high-utility or words children are likely to encounter in future conversation or readings (Beck et al., 2013), (b) relate to the context of the story in a significant way, and (c) can be taught effectively (i.e., defined with a child-friendly definition, illustrated, and can be connected to a number of contexts familiar to children.

Dependent Variables and Recording Method

The primary dependent variable was the frequency of educator's use of three SBR strategies. These data were collected via video recording by the educator and uploaded to Vosaic, a secure, cloud-based coding platform. Use of question/evaluate, expansion, and repeat prompts were calculated as a fidelity percentage. Child responses on the expressive and receptive vocabulary probes were an indirect measure of the educators' use of SBR strategies; responses were typed by each educator directly into the researcher-provided form in the Google drive. Changes in scores from pre- to posttest were calculated to summarize the receptive and expressive vocabulary data for the child participant.

Intervention Fidelity Checklist

Three book readings each week were coded to determine fidelity to the three SBR strategies. During baseline and intervention, the educators' behaviors were coded in a binary fashion (i.e., present or absent) according to strategy use. However, during all intervention

sessions, the educators were also provided with scripted supports (i.e., teacher worksheet). The first strategy, *question/evaluate,* included three types of questions: *labeling* (elicit target word), *definition* (elicit definition of target word), and *inference* (elicit a response requiring integration of information from the book with prior knowledge or experiences). Responses to each question were evaluated as either correct, the teacher confirmed and repeated (e.g., Child says, "wolf," Teacher says, "That's right, it is a wolf."), or incorrect, the teacher provided a direct model (e.g., Child says, "I don't know," Teacher says, "It is a wolf."). The second strategy, *expand*, was operationally defined as adding 1–2 more words to the child's response. If a direct model was provided, the child was prompted to repeat the model. The third strategy, *repeat*, was operationally defined as prompting the child to repeat the adult's expansion. If a direct model was given, the child was asked to repeat both the model and the expansion. Educator behaviors were coded as a percentage of correct opportunities out of twelve (i.e., four target words per book X three question types). Before beginning the study, scripts were developed for all books used during intervention. Scripts included the three target strategies as well as corrective feedback for evaluating the child's response for the question/evaluate strategy. Target vocabulary words for each book were determined by the child's score on a screener, described below.

Expressive & Receptive Vocabulary Probes

Each child participant was screened on their knowledge of target vocabulary words (i.e., between 5–6 words) before each book was introduced. The child was asked to provide a definition for each word, only words for which the child could not provide a definition or multiple examples were considered for inclusion as a target vocabulary word. Four words per book were selected (e.g., dance, creep, giraffe, jungle). Researcher-developed pre and posttest probes were administered weekly by the para or SLP-A and assessed children's receptive and

expressive vocabulary knowledge. The expressive vocabulary probe included naming the target word, providing a definition, and answering inferential questions related to the target word. The educator could not comment or provide feedback on any correct/incorrect responses, but could praise the child for working and listening. A total of 32 words were included on the expressive probe. Table 2 includes criteria and examples from the scoring protocol. The receptive probe showed a menu of four picture choices (i.e., Google images) that required the child to point to the correct image corresponding to the target vocabulary, as the educator would say, "Show me… X". The probe was presented to the child on a tablet. Children's receptive responses were scored in a binary fashion, one if they identified the correct picture and 0 if they did not.

Experimental Design

A single-case multiple-baseline across behaviors design (Ledford & Gast, 2018) was used to examine the effects of PBC with scripted supports on implementation of SBR strategies. A multiple-baseline design is used to assess treatments designed to improve desirable behaviors (Ledford & Gast, 2018) and are more appropriate for academic or non-reversible, trial-based behaviors. Educators were instructed to and completed book readings across phases (i.e., baseline, intervention, and maintenance) three times per week. Behaviors were functionally independent; introduction of the independent variable to one behavior would not bring about change in other untreated behaviors. The behaviors were also functionally similar such that the independent variable is likely to have the same or similar effect.

Procedures

Following the consent process, the educator entered the baseline phase. When visual analysis indicated a low, stable trend, the educator was coached on the question/evaluate strategy and immediately moved into intervention. When visual analysis indicated high and consistent

implementation of behavior one, the participant was trained on expansions. The same procedures were followed for the repeat strategy. Child level data were collected prior to reading a book on day one (i.e., pretest) and immediately following book reading on day 3 (i.e., posttest). Social validity information was collected from all 5 early childhood educators following the study.

Baseline

Educators began the baseline phase by reading books to the child participant. Educators were told to read as they normally would. The researchers randomly assigned a book to the baseline condition for each educator; four data points were collected in baseline.

Intervention

The independent variable was PBC with scripted supports for three SBR strategies and consisted of a training session on each strategy and weekly coaching sessions. Prior to implementation of each of the SBR strategies, a 15-minute training session was conducted by the coach using a PowerPoint presentation, following scripted procedures where the individual strategy was identified, described, and examples/opportunities to practice provided. Following the training session when the first behavior was introduced and taught, the educator used the next book from a randomized list created by the research team. This book was read 3 times over the course of a week using the taught strategy; the educator was also provided with the teacher worksheet (i.e., scripted supports). Behaviors two and three followed the same procedures. Educators were instructed to implement scripted prompts (i.e., 12 question/evaluate, 12 expand, 12 repeat) within each storybook. Educators participated in weekly coaching sessions over the course of the 10-week intervention. Sessions were scheduled after the educator completed three readings with the same book, lasted approximately 45-60 minutes, and followed the PBC coaching framework (Snyder et al., 2011). Prior to each coaching session, the coach reviewed the

educator's book reading sessions and completed a performance feedback sheet. Included on the sheet was the educator's goal for the week, graphed data representing progress toward the weekly goal, a written summary of the data, and video clips representing strategy use as well as missed opportunities. Together, the educator and coach reflected on and identified what went well, what could be improved upon, and whether the weekly goal had been met. Next, the coach provided guided practice and modeling of strategy use using the teacher worksheet. Last, specific supports needed to meet the goal were identified by the educator, and a timeline established for meeting the goal were recorded on the action plan form.

Maintenance

The maintenance phase was similar to baseline but utilized materials from the intervention phase. However, coaches no longer worked with the educator to develop scripted supports for the books and formal coaching sessions were not held. The educators had access to the teacher worksheet and all participants scripted their own books for the duration of the maintenance phase.

Coaching Fidelity

Two graduate research assistants (GRAs) served as the intervention agents (i.e., coaches). Both were full-time doctoral students and had prior experience coaching educators and working with preschoolers. Training involved direct instruction of the coaching procedures, via a Power Point presentation. The first author presented and talked about the specific behavior and described the steps for implementing the behavior (e.g., read the page, ask the scripted question, provide 3-5 seconds of wait time, and evaluate the child's response); the same format was followed for the subsequent behaviors. Next, the GRAs and first author reviewed and practiced all items on an implementation fidelity checklist. The GRA practiced delivering the training until

100% criterion was reached. The GRAs met the criteria after completing two training sessions. All training sessions were analyzed by the first author to determine adherence to the scripted procedures described above, 100% fidelity was met. Fidelity data on coaching sessions was collected by two graduate students. The first and second authors trained the graduate students to 100% adherence to the coaching protocol using the same fidelity checklist mentioned above. The graduate students were each assigned one coach and independently coded 100% of those videos. The first author randomly selected 20% of videos from each coach and independently coded those videos. Coaching did not occur during the baseline or maintenance phases. To calculate fidelity, the number of procedural elements correctly implemented was divided by the total number of procedural elements and then multiplied by 100. Mean fidelity was 95%.

Inter-observer reliability

Four graduate student reliability coders were trained by the first and second authors on all target strategies, and simultaneously viewed and independently coded the strategies on a researcher-created coding form embedded within the Vosaic platform, for 100% of all videos across the three phases. Two coders were assigned to Alan, Miranda, and Susan and two separate coders were assigned to Leena and Amelia for the duration of the study. Coders participated in fidelity training conducted by the first author in two phases. During Phase 1, the coders received instructions detailing procedures for using the coding form, as well as operational definitions of all codes. Phase 2 of coding training consisted of watching training videos where all coders simultaneously and independently documented the presence or absence of each behavior. Immediately after each coder completed the scoring, results were compared and discussed with the first author. Differences in ratings were compared to the operational definitions, and rectified. The same process occurred for two training videos at which point coders were able to

demonstrate at least 80% fidelity on the coding form. Total fidelity was calculated by dividing the number of indicators where the coders were in agreement by the total number of indicators that were simultaneously coded, then multiplying the quotient by 100. Inter-observer reliability for each educator was as follows: Alan was 93% (range = 80-100%); Amelia was 98% (range = 92-100%); Leena was 95% (range = 77-100%); Miranda was 92% (range = 77-100%); and Susan was 100%.

Each educator recorded child's responses on the vocabulary probes in real time. A trained member of the research team transferred the data from forms uploaded into the Google drive, to a master spreadsheet. One hundred percent of the expressive and receptive vocabulary probes were scored independently by the second author and a trained member of the research team who then met to resolve disagreements. Accuracy for pre- and posttest was 100%.

Social Validity

Paras' perceptions of the intervention were assessed through a survey, targeting the acceptability, appropriateness, and effectiveness of the intervention. The survey included 25 questions that were a combination of select all that apply/ranking (n = 2) yes/no (n = 4), open-ended response (n = 11), and 5-point Likert-type scale (n = 7) (adapted from Author et al., in press). The Likert scale items ranged from *strongly agree* to *strongly disagree*, with *neither agree nor disagree* as a neutral item.

Data Analysis Procedures

Visual analysis was used to determine the impact of the coaching intervention on the educator's fidelity of use of targeted strategies across all phases. Within condition visual analysis included evaluating the level, trend, and variability of data. Additionally, between conditions visual analysis analyzed the immediacy of effect, overlap of data in adjacent phases, and the

consistency of data patterns in other conditions (Ledford & Gast, 2018). Visual analysis is the most frequently utilized data analysis method for single-case research design for evaluating the presence of a functional relation (Ledford & Gast, 2018). Tau-U estimates were also used to determine the effect size for each behavior. Tau-U is a widely used effect size calculation in single-case research design because it incorporates intervention phase trend when measuring non-overlapping data (Lee & Cherney, 2018).

Results

To answer the first research question, data for the total number of strategies used by phase were analyzed visually and calculated as a fidelity percentage (see Figures 1-5). To answer the second research question, gain scores from the expressive and receptive vocabulary knowledge pre- and post-tests were computed. To address the third research question, responses to the social validity survey were analyzed for all five participants.

Alan

During baseline, question/evaluate and expand strategies were implemented by Alan 20% or fewer times; the repeat strategy remained at zero. When question/evaluate was introduced, there was an immediate increase in level and a positive upward trend. In the first session following the intervention, Alan implemented question/evaluate with 75% fidelity and increased to 100% fidelity in the second session. Immediate changes in level and positive upward trends were also observed for behaviors two and three, increasing to 100% on the first session following intervention, remaining high and stable (range 92% to 100% fidelity). For all behaviors, fidelity remained above 80%. There was no overlapping data between baseline and intervention for any behaviors. During coaching sessions, Alan was able to complete the teacher worksheet with little assistance from the coach; therefore, supports were faded at coaching session three. Maintenance

data indicate Alan was able to consistently use the strategies at a high and stable level. TAU-U was equal to 1 for question/evaluate ($p < .001$), expansions ($p < .001$) and repetitions ($p < .001$), indicating a very large effect size.

Amelia

During baseline, visual analysis indicated variability for the question/evaluate strategy (range 0 – 37.5%), low levels of implementation (less than 10%) for expansions, and no implementation of the repeat strategy. Upon introduction of behavior one, Amelia demonstrated an increase to 37.5%. Data for sessions 6 & 7 decreased to 25%, but showed an increasing trend to 50% by session 8. By session 9, data showed a significant upward trend to 87.5% and remained high and stable for the remaining sessions. And immediacy of effect was demonstrated for behaviors 2 and 3 and data remained stable ranging from 83% to 100% fidelity for expansions, and 92% to 100% for repeat, for all remaining sessions. There was no overlapping data between baseline and intervention for any of the behaviors. By coaching session six, Amelia was able to complete the teacher worksheet for the question/evaluate strategy with minimal assistance from the coach; therefore, supports were faded. TAU-U was equal to 1 for question/evaluate ($p = .0017$), expansions ($p < .001$) and repetitions ($p < .001$), indicating a very large effect size. Maintenance data remained high and stable for Amelia.

Leena

During baseline across all behaviors, visual analysis revealed no strategy use. Following introduction of behavior one, Leena immediately increased use to 100% fidelity. Data remained stable for behavior one ranging from 83% to 100% fidelity. An immediacy of effect, trending upward, was also seen for behaviors two and three. Behavior two (range 83% to 100% fidelity) remained stable and there was no overlapping data between baseline and intervention. In the two

sessions immediately after behavior three was introduced, Leena demonstrated lower use of the *repeat* strategy (83% and 67%, respectively). However, after a coaching session, Leena demonstrated an increase to 92%, averaging 85% through the end of the intervention phase. By coaching session 6, Leena was provided the target words and definitions and wrote prompts in the teacher worksheet independently prior to coaching. TAU-U was equal to 1 for question/evaluate ($p = .0019$), expansions ($p < .001$) and repetitions ($p < .001$), indicating a very large effect size. Maintenance data for Leena demonstrated she was able to consistently use the question/evaluate and repeat strategies while data for expansions was low and variable.

Miranda

Miranda's use of all 3 behaviors during baseline was low and stable, some variability was observed for expansions, but remained below 20%. Upon introducing the intervention, an immediate increase in level and a positive upward trend was observed. Behavior one was variable through session 19, averaging 92% (range 38 % - 100%), then remained at 100% for the remainder of the intervention. After an initial immediacy of effect for behavior 2, Miranda's data were variable, averaging 86% (range 42% - 100%). An immediacy of effect was observed for behavior 3, with data remaining high and stable, ranging from 75% to 100%. Miranda had to quarantine during the study; therefore, intervention was inconsistent, resulting in gaps (approximately 2 weeks between sessions 13 & 14) in data collection. Supports were faded beginning at coaching session six. Miranda maintained all 3 behaviors at 92% or above. TAU-U was equal to 1 for question/evaluate ($p = .0017$), expansions ($p < .001$) and repetitions ($p < .001$), indicating a very large effect size.

Susan

Susan demonstrated low levels of all target behaviors during baseline, ranging from 0 to 17%. Upon introduction of the first behavior, an immediacy of effect was observed, Susan's implementation increased to 94%. The next six sessions were variable, averaging 84% (range 75% - 94%), until session 12 when Susan reached 100% and remained. An immediacy of effect was visible upon introduction of expansions and repeat, both remained high and stable, averaging 94% and 98%, respectively. Susan maintained use of all behaviors with no supports provided. TAU-U was equal to 1 for question/evaluate ($p < .001$), expansions ($p < .001$) and repetitions ($p < .001$), indicating a very large effect size.

Research Question 2 - Children's Vocabulary Knowledge

All participating children made gains on the expressive vocabulary knowledge portion (data available as supplemental material). A maximum of 64 points was possible, and scores on pre-test ranged from 5-26. On post-test, scores ranged from 15-46. Gain scores were computed by subtracting pre-test scores from post-test scores. The average gain score for the group was 14.2, with a range of 8-20 points. On the receptive vocabulary measure, all but one child made gains. A maximum of 32 points was possible, and score on pre-test ranged from 15-20. On post-test, scores ranged from 19-29. The average gain score was 6, with a range of 0- 11. To examine maintenance for targeted vocabulary words, a total of 10 words were chosen for each child participant. This included five words on which the child made a gain from pre- to post-test and five words with no gain from pre- to post-test. The words were balanced within each category to include nouns, verbs, monosyllabic words, and multisyllabic words. For the expressive vocabulary knowledge portion, a maximum score of 60 points was possible. The average score for the group was 22.4 and scores ranged from 13-30. For the receptive vocabulary knowledge

portion, a maximum score of 10 points was possible. The average score for the group was 9.6 and scores ranged from 8-10.

Social Validity

Overall, participants provided a rating of "Strongly Agree" for most Likert-type questions regarding PBC and shared book reading. One participant indicated they "Somewhat Agree" with the statement, "The book reading strategies are appropriate for a variety of preschool age children." and a different participant indicated "Somewhat Agree" with the statement, "The book reading strategies are beneficial for the child I worked with in study." All participants indicated they would use the book reading strategies taught through PBC in the future and feel "comfortable" with the book reading strategies learned.

Discussion

The current study utilized a single-case, multiple baseline across behaviors design to examine the effects of PBC on educators' fidelity of implementation of SBR strategies. This PD intervention offers an example of how IS frameworks can be used to enhance the quality of vocabulary instruction for early childhood educators working with preschool children with language delays. In what follows, we will expand upon two primary findings. First, the results of the study were promising, indicating educators were able to implement SBR strategies with fidelity and at consistently higher rates than were observed during baseline. Second, all child participants showed increases in both their expressive and receptive vocabulary knowledge of targeted words during the intervention phase as measured by gain scores from pre- to posttest.

Systematic PD is an implementation support that can be used to increase the capacity of professionals to use an intervention (Odom et al., 2014). As such, the present study makes an important contribution to IS. Binger et al. (2021) argue through IS, "all stakeholders—including

researchers, individuals with communication disorders and their families, clinicians, administrators, and payers—can work together not only to achieve better implementation of research-based practices but also to create better interventions through these partnerships," (p. 1040). Fixsen and colleagues (2010) identified implementation drivers as critical to the success of improving practitioners use of EB practices. One specific type of implementation driver noted by Sexton and Rush is the use of implementation guides to, "provide practitioners with the supports and structure needed to ensure they are equipped with concrete ideas about how to immediately operationalize the practices in the field," (2021, p. 16). Included in this study were scripted supports, a variation of an implementation guide, that proved to be successful in helping the paras and SLP-As use the SBR strategies with fidelity (with faded coaching supports), and maintain a high-level of fidelity once coaching supports were removed.

Previous research points to PD that is less effective (e.g., one-time workshops) in creating sustained changes in professionals' practice (Joyce & Showers, 2002). However, features such as focused content, opportunities for job-embedded practice, reflection on practice, sustained and on-going coaching, follow-up support to continue use of practices, and sufficient time and intensity of PD are thought to support implementation in EC settings (Snyder et al., 2012), and are more likely to lead to lasting change. Additionally, video reflection is widely used to facilitate feedback and reflection in educational research (Marturana & Woods, 2012). Watching one's practice, reflecting on it, and receiving feedback from a coach helps to support teacher practices (Romano & Schnurr, 2022). Reflective feedback was included to support educators in reaching fidelity, aligning with research suggesting that on-the-job PD with hands-on practice is more effective than didactic PD (Joyce & Showers, 2002). Opportunities for practice with

coaching are critical for educators, like paras and SLPAs, who are often tasked with delivering specific interventions without the appropriate training.

Our second main finding was that the child participants exhibited gains in expressive and receptive vocabulary knowledge. It appeared that vocabulary learning occurred after educators directly taught the child the definition of the word and tied it to their background knowledge through specific question prompts with evaluation, expansions, and opportunities to repeat. All children in this study had language delays and were receiving special education and/or related services. As such, the present intervention adds to the body of literature showcasing that children with language delays can learn new words, in the context of storybooks (Storkel et al., 2017).

Overall, the PD program was positively reviewed by participants, increasing its utility, feasibility, and acceptability. The five educators stated they enjoyed the PD program and will continue using strategies in the future. Further, the educators were able to implement the strategies with one child, while still engaging in other job-related responsibilities. The virtual coaching format allowed scheduling flexibility for both coaches and educators and lends itself to future research in which individualized coaching sessions with a trusted coach or colleague; for example, ECSE teachers and/or SLPs could be incorporated.

Implications for Research & Practice

Educators administering interventions often have various levels of experience and motivation, work in complex settings, and make decisions that ultimately impact child outcomes, in challenging and sometimes conflicting circumstances (Binger et al., 2021). Incorporating additional aspects of implementation science (e.g., creating a logic model, identifying implementation outcomes) into future studies can help to inform the field on the types of PD that lend themselves to successful and sustained uptake of EB practices by early childhood educators,

in addition to providing guidance to EC programs who must carefully weigh costs and benefits when choosing and employing PD approaches (Binger et al., 2021; Romano et al., 2021). It is critical to test PD approaches with evidence of promise and assess which components were the necessary ingredients to support changes in practice (Metz et al., 2013). The added feature of scripted supports was not systematically manipulated in this study. Therefore, future research is needed to better understand the potential of implementation guides to provide practitioners with the scaffolding needed to operationalize target practices more quickly after training.

Limitations

Target words selected for this study were not controlled for phonological complexity, frequency, or other lexical characteristics that contribute to word learning (e.g., Author). Future work may consider manipulating, or controlling for, these factors. Measuring vocabulary gains for preschool age children, particularly those with disabilities, remains a challenge. One limitation could be the use of a scoring rubric to measure depth of vocabulary knowledge. Adapted from a previous study (Author), the scale was not interval, and the distinct scoring criteria may not accurately represent children's depth of knowledge. For example, a child who was able to provide two examples and a clear definition of a word would receive the same score as a child who provided only a clear definition. Dicataldo and colleagues (2022) developed two probes, one for measuring vocabulary and a second for comprehension of inferences. This approach to measuring vocabulary may better capture and represent the knowledge preschoolers have about taught vocabulary words, future research could include a similar measure.

Summary and Conclusions

This early efficacy study was conceptualized with the eventual goal to develop a sustainable and feasible PD program that could be delivered to a specific population of EC

educators in a variety of settings. Paras and SLPAs spend a substantial amount of time with children who have language delays, yet they often receive less training, or are not prioritized to receive PD (Author). Our results support that a structured PBC approach is effective at increasing educators' use of explicit vocabulary instruction during shared book reading. Further, the implementation of vocabulary instruction had downstream effects on children's vocabulary knowledge. Finally, educators' responses to the social validity survey indicate their support of the intervention in terms of appropriateness and feasibility.

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Table 1

Demographic Characteristics of Educators

Dyad name	**Educator Type**	**Certifications**	**Licensure**	**Years of Experience**	**Caseload Size**	**Professional Development Related to Literacy**
Alan	SLP-A	No	Yes	11	100	Within the past year
Leena	SLP-A	No	Yes	4	20	Within the past 5 years
Susan	SLP-A	Yes	No	3	67	Within the past 10 years
Miranda	Para	No	No	6	20	Within the past 5 years
Amelia	Para	Yes	No	1	19	Within the past year

Table 2

Scoring Protocol for child level variable

Score	Question Type	Criterion	Example
3	Definition	Clear definition from intervention; Provides a novel definition or synonym	Jump high in the air/jumps up; hops; A big, strong mouth
	Inference	Reasonable response based on personal experience/background knowledge	I can leap when running outside; A tiger has jaws
2	Definition	Provides a specific example & model; provides two specific examples	Frog leapt; participant leaps I leapt over a toy; Rabbits leap
	Inference:	Provides a response based on context of the book only	The frog leaped; Rabbits leap/A stag beetle has jaws
1	Definition	Provides partial definition; provides meaningful use of the word in a phrase or sentence; OR accurately modeled the word	Go over something; You leap over a puddle; Participant leaps/points to mouth
	Inference	Provides a model	Participant leaps; participant points to jaws
0	Definition	Incorrect, no response, or repeats the word; related but inadequate response; inappropriate use of the word	run, leap; children leap/jaws; elbow; points to elbow; eat
	Inference	Incorrect, no response or repeats the word; related but inadequate response; inappropriate use of the word	run, leap; children leap/jaws; bird

Figure 1

Alan's percentage of strategy use

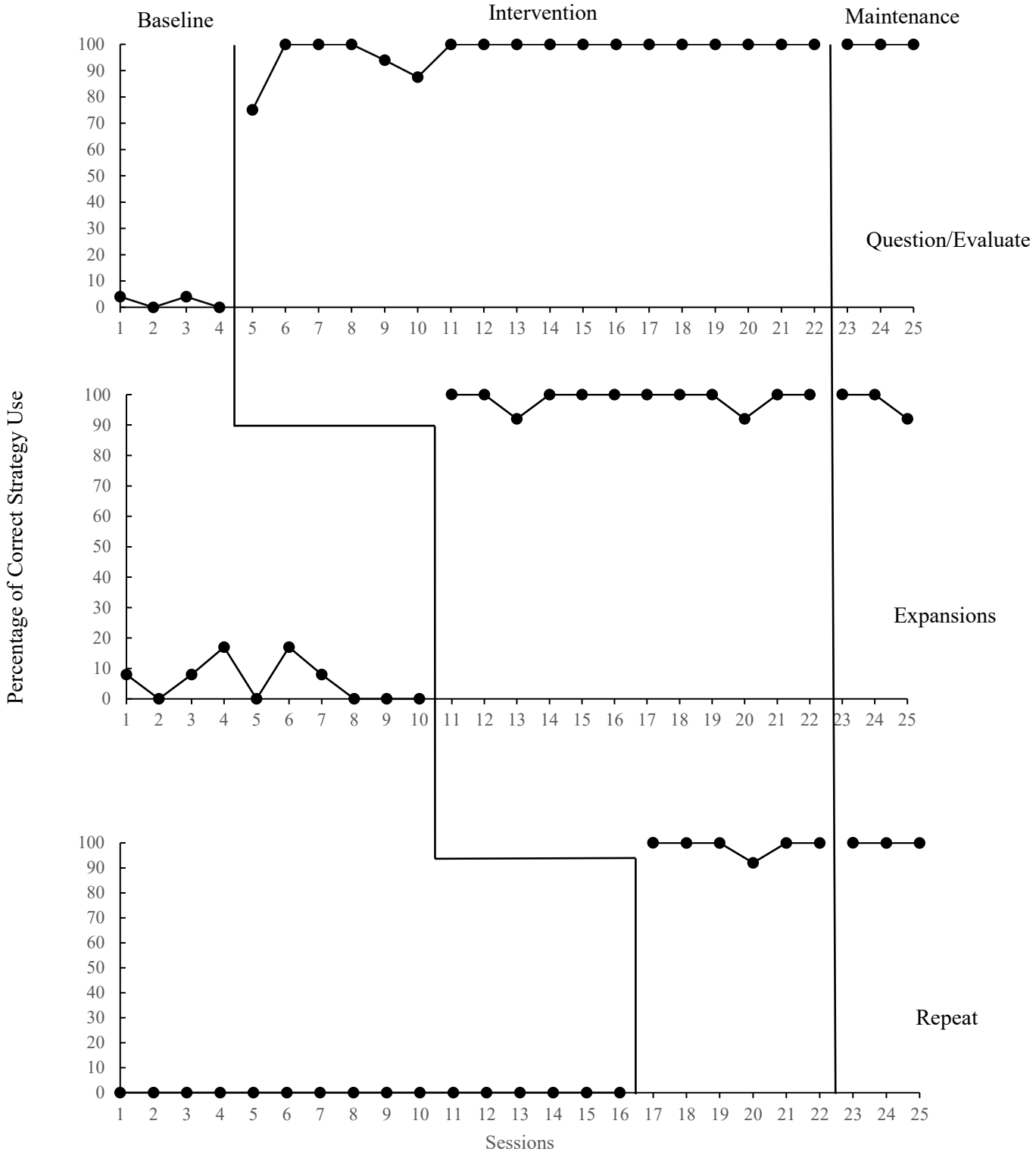

Figure 2

Amelia's percentage of strategy use

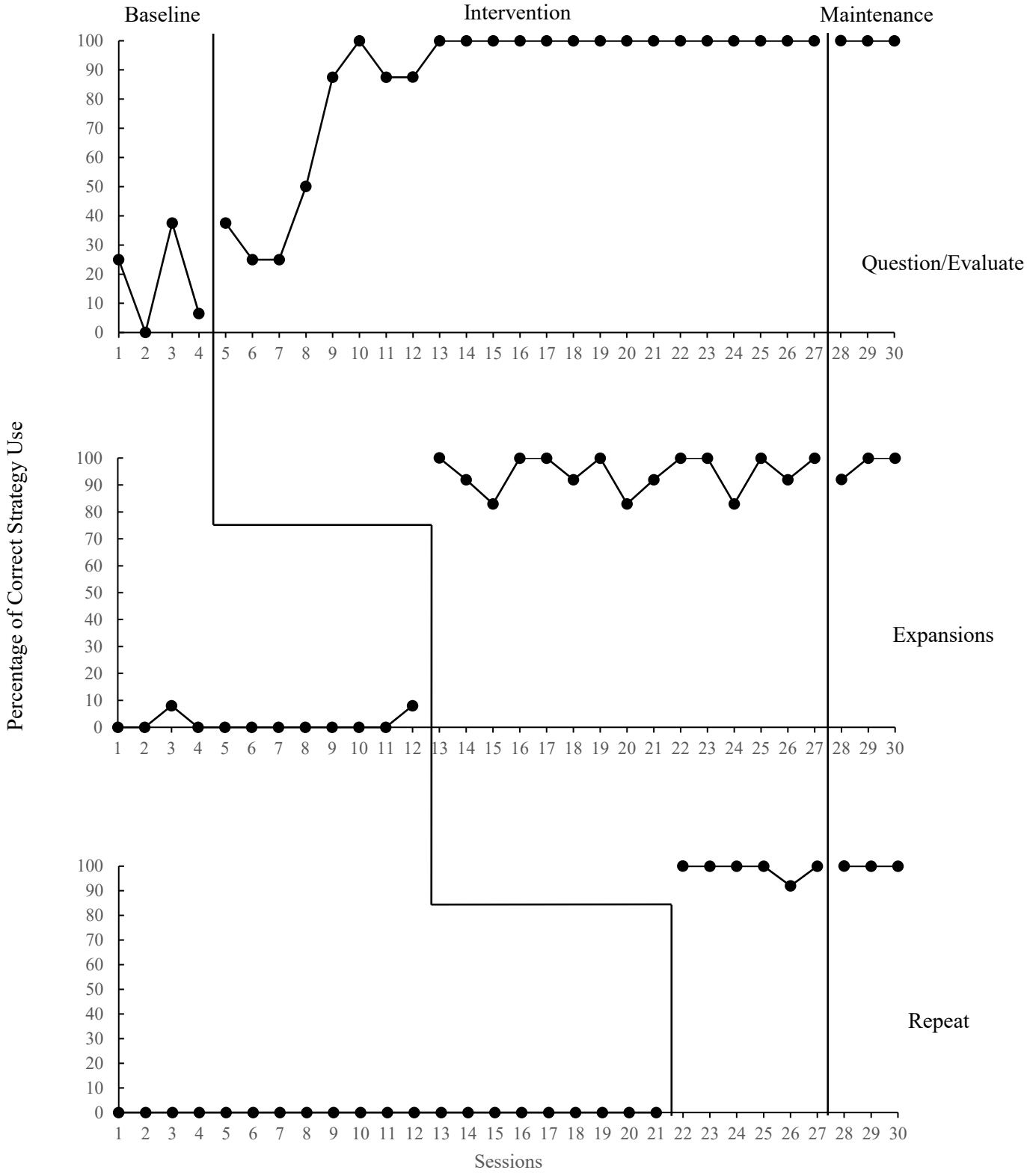

Figure 3

Leena percentage of strategy use

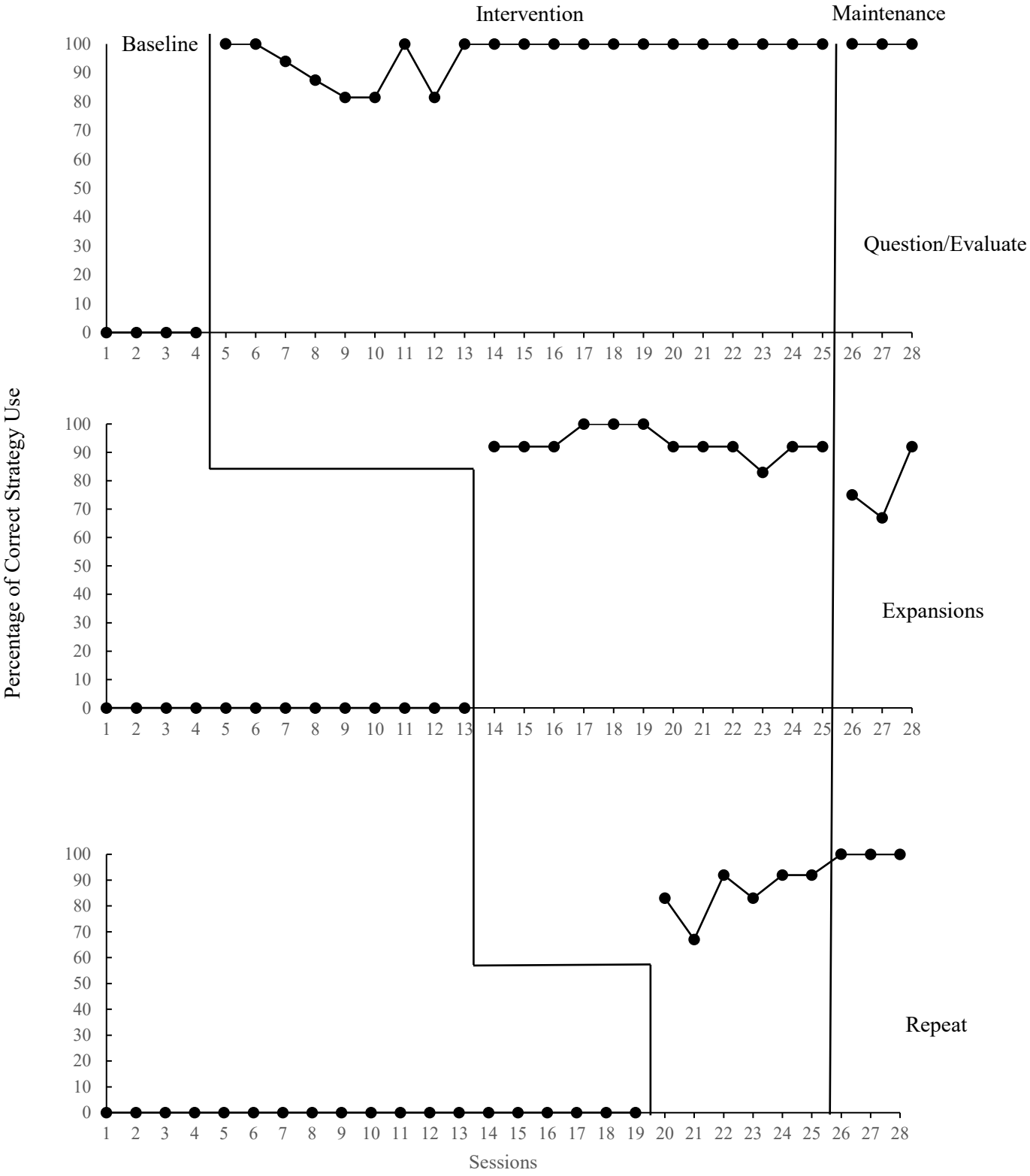

Figure 4

Miranda's percentage of strategy use

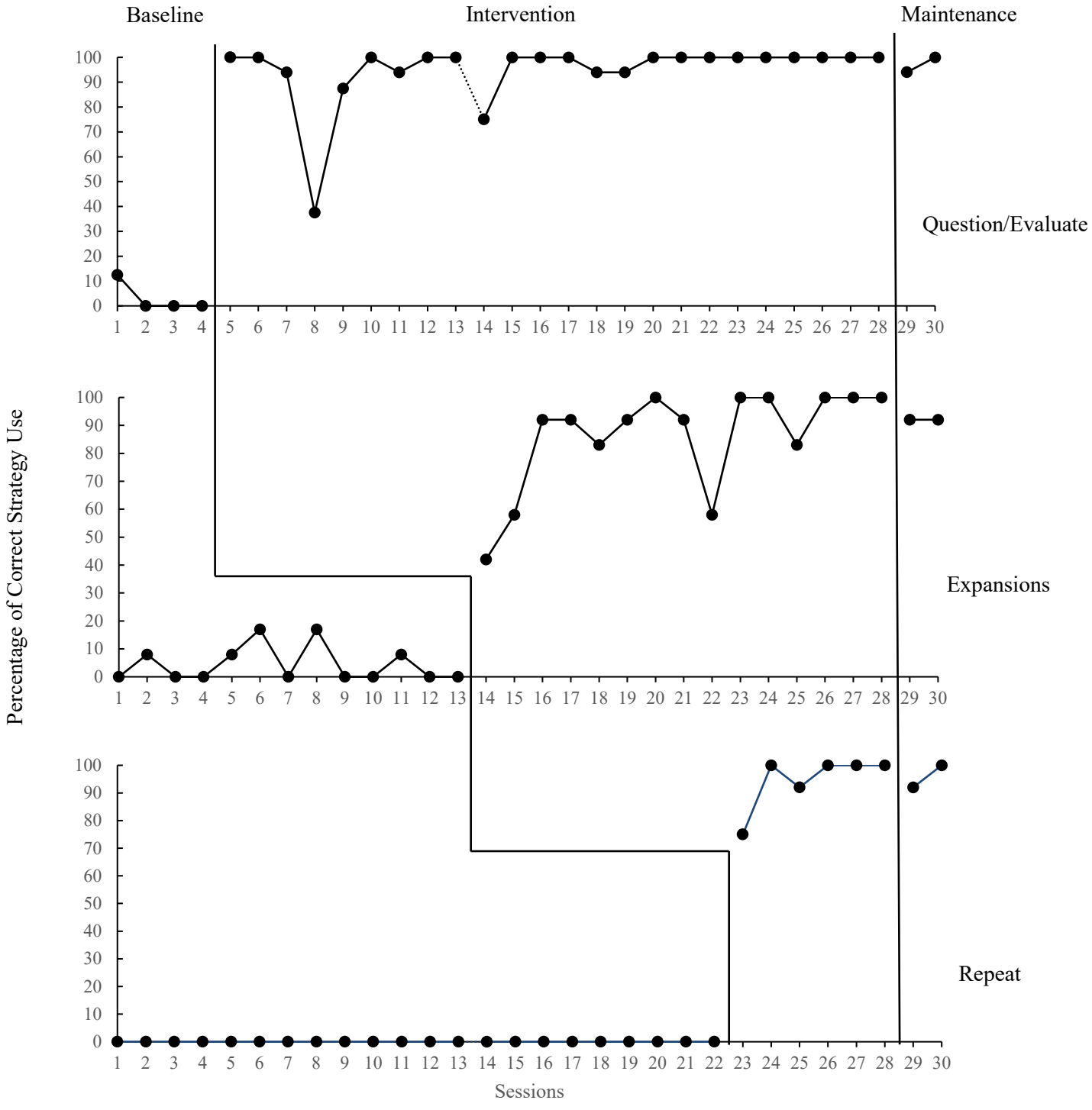

Figure 5

Susan percentage of strategy use