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Supporting Intervention Fidelity of Dialogic Reading to Support Preschool Children's Early Literacy Skills

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Abstract

Early literacy skills are key indicators of later reading success, and early literacy instruction in early childhood education can support both positive academic and behavioral child outcomes. Dialogic reading (DR) is an evidence-based intervention that targets early literacy skills like oral language, vocabulary, and print concepts. Although research suggests DR has the potential to impact the early literacy skills of young children, intervention fidelity must be maintained for the intervention to be effective. Two single case design studies were conducted in an early childhood setting that together examined (a) the effects of intervention supports on the intervention fidelity of educators performing interventions, and (b) early child literacy outcomes when educators accessed DR intervention supports. Study 1, an alternating treatment design, focused on intervention scripts and an intervention checklist on intervention fidelity. Findings indicated that both supports equivalently increased educators' (N = 4) intervention fidelity, though the educators preferred using a checklist. Study 2, a multiple baseline design, examined the effects of the intervention supports and subsequent increased intervention fidelity on child early literacy across four children. Findings indicated increased book-based vocabulary for children during the intervention phase when intervention fidelity levels were higher. Taken together, the studies suggest intervention fidelity for DR is best delivered with support from checklists or other methods, and that ensuring that DR is delivered as intended may help bolster children's reading skills.

Keywords: *early literacy, intervention fidelity, dialogic reading*

Dialogic Reading and Supporting Intervention Fidelity

Early literacy skills are key indicators of later reading success. The National Early Literacy Panel (NELP) convened in 2008 to determine key early literacy skills and the implications for teaching reading. Understanding print concepts, letter naming, vocabulary, and phonological awareness are among 18 skills significantly correlated with later reading success (NELP, 2008) and can be targeted through shared reading interventions. Only 35% of children in the fourth grade are proficient in reading, a gap that remains into eighth grade (United States Department of Education, 2019) with low academic achievement identified as a major risk factor for later school dropout (Gubbels et al., 2019). Early intervention in reading is critical to alleviate this problem. Preschools offer an environment for prevention and early intervention efforts that can positively impact the lives of children, including systematically implemented interventions that build early literacy skills (Neuman, 2009). The purposes of this study were to investigate educators' intervention fidelity during a dialogic reading intervention and to consider implications for intervention quality provided to preschool children.

Dialogic reading (DR), a formalized approach to shared reading (i.e., reading story books with children while asking relevant questions), targets early literacy skill development. Whitehurst et al. (1994) developed the intervention to target children's vocabulary and print concepts development and found that 94 children attending Head Start centers who engaged in DR significantly improved in these areas, as compared with a no-intervention control group The intervention included training educators to read with children using a formalized, sequential procedure for extratextual interactions: Prompt, Evaluate, Expand, and Repeat (PEER). Within the Prompt strategy, questions covered any area of the text with these prompts: Completion, Recall, Open-ended, Wh-, and Distancing (CROWD). Given the PEER and CROWD procedures, DR provided a replicable method, as compared with shared reading

interventions, which lack a universal approach. DR also included direct instruction with performance feedback for children as well as extratextual questions.

Lonigan and Whitehurst (1998) replicated the DR intervention with preschool children from low SES backgrounds, building on prior DR research with middle-class families, with similarly promising results to those of Whitehurst et al. (1994). More recently, Towson et al. (2016) investigated DR with children with Individualized Education Plans (IEPs) in the special education category of developmental delay and found the method to be effective. Additionally, positive child outcomes related to children's vocabulary development were found across socioeconomic groups (Zevenbergen et al., 2003).

DR research assumes that procedures are consistently implemented as intended, or with intervention fidelity, yet many studies do not fully utilize the PEER and CROWD procedures that are hallmarks of DR (Towson et al., 2017). The original research study by Whitehurst et al. (1994) and the Lonigan and Whitehurst (1998) follow-up both noted that implementer compliance with the intervention was a significant factor limiting the results, and subsequently separated analysis between groups with low and high fidelity. Even when implementers initially implement an intervention as intended, compliance may shift from training. Also, drift may occur that limits the integrity of the intervention, for example Zibulsky et al. (2019) noted that drift occurred in the frequency of CROWD prompts following training.

With low intervention fidelity, child outcomes resulting from an intervention may suffer (Forman et al., 2013). Intervention fidelity can be enhanced through a variety of approaches, including the use of checklists or task lists, and post-training support (Guskey, 1991). Checklists are a form of self-assessment to promote fidelity to evidence-based practices (Barnett et al., 2014), such as shared reading (Pentimonti et al., 2012). Towson et al. (2016) provided interventionists with scripted interactions taped to the books, including fifteen CROWD prompts to target vocabulary words. Fidelity

remained high for the intervention. Interventionists were also able to consistently ask questions about target vocabulary words over different readings. In sum, DR may require explicit implementation supports to be implemented with fidelity. Research is needed to understand what supports enhance DR implementation integrity.

Purpose of the Studies

The current project included two interrelated research studies. The first study examined the effects of intervention fidelity supports, including a DR checklist and a full book script, on interventionists' fidelity to a DR protocol. The second study investigated if early child literacy skills were improved with increased implementation fidelity. The utilization of a supporting checklist or script was compared to a no support condition. Research questions were:

1. Does DR, when implemented with a checklist, result in higher fidelity than DR implemented without supports?
2. Does DR, when implemented with a book script, result in higher levels of fidelity than DR implemented with a checklist or DR implemented with no supports?
3. Do children experience more growth in target book vocabulary and print concepts in the best intervention condition compared to DR with no supports?

Method: Study 1

To address the first and second research questions, the researcher manipulated the supports given to interventionists to determine the level of intervention fidelity across conditions.

Participants and Setting

Study 1 participants were four educators from a university-based constructivist preschool in the Midwestern United States. Constructivist schools provide children agency to direct their own learning through exploration. The classrooms in this school included

open-ended activity stations and explorative play, with educators following children's lead. All educators at the preschool were emailed about a professional development research opportunity and responding educator pairs who considered shared reading time appropriate for their classroom were included in the study. Rebecca was a Black female in her first year of teaching. Taylor was a White female who had taught at the preschool for three years. Barry was a White male in his eighth-year teaching at the preschool. Kendra was a White female in her first year of teaching. All teachers are identified by pseudonyms. All had master's level training in Early Childhood Education and served between seven and nine children per classroom. Educators worked in pairs within their classrooms (Rebecca with Taylor, and Kendra with Barry). The preschool accepted tuition and Head Start children, with approximately 53% White, 28% Black, and 19% other children of color ($N = 139$ across all classrooms). All classrooms and educators applied some shared reading procedures already, in place during circle time and at a child's request during free exploration periods.

Materials

Books from the classroom were utilized in the study, and two new books (*Caps for Sale* (Slobodkina, 1940) and *No Roses for Harry* (Zion, 1957) were also provided to the educators for the scripted portion of the alternating treatment design as appropriate texts to engage in DR with preschoolers (Zevenbergen & Whitehurst, 2003). These books had limited amounts of text, and large pictures. The researcher developed a training video for educator and data collector training, which included an overview of the PEER and CROWD acronyms associated with DR and examples of each. A checklist bookmark was provided to the educators for a portion of the study. The bookmarks had each portion of the script listed (see Appendix A).

Dependent Variables

Educator Fidelity

Data collectors (i.e., trained school psychology graduate students) used a checklist to collect intervention fidelity data (see Appendix B) wherein DR procedures were converted into a checklist (Hawkins et al., 2008). This checklist included a tally box for eight PEER and CROWD items. To calculate the percent fidelity, the number of areas completed on the checklist was divided by 8 and multiplied by 100. As each letter of the CROWD acronym is a prompt, the "P" in PEER was not counted in the calculation to remove redundancy. Data were collected once a day from an observation booth that viewed the classroom from an adjacent room and two-way mirror. Percent of intervention fidelity was the main variable of interest in the study.

Data Collector Training

Data collectors were trained to recognize DR procedures, and then viewed a pre-coded video and completed a data form to check for appropriate intervention fidelity. The data form and pre-coded form were compared to calculate total count interobserver agreement (IOA) for each area of PEER and CROWD. Observers reached an acceptable level of 85% IOA with the researcher before independent data collection (Kennedy, 2005). IOA was collected for approximately 20% of sessions across all phases (Kennedy, 2005), averaging 91% overall IOA across the study.

Procedure

The researcher met with each educator participant to explain study procedures and gain informed consent. Next, data collection began for the already implemented shared reading procedures. The educators chose to read to children during morning exploratory play and were asked to read at least once during this time period.

Baseline

During this phase, educators read to children as they normally would. Educators were not given special instructions except to read to children at least once during the morning exploratory play period. The educators read classroom books with their children for approximately one week, with baseline data collected using the intervention fidelity checklist.

Educator Training

After initial baseline, the educators viewed a training video and recorded their own book reading to demonstrate the PEER and CROWD sequence. The researcher introduced each acronym, provided explanations, examples and non-examples, and modeled a sample reading. The researcher watched the educator recordings to determine that the educators performed all aspects of the PEER and CROWD sequence before beginning data collection for Phase B. Each area of PEER and CROWD is defined in Appendix C, as well as what was coded in the sample reading to indicate adherence to each portion of the protocol.

Post Video Training

Following training, each educator performed DR with no supports in place, consistent with prior research (e.g., Whitehurst et al., 1994; Lonigan et al., 1999). At the beginning of the condition in this study the researcher prompted: "Please use what you have learned to implement dialogic reading during your reading times." The educators chose books from their classroom to read to their children for approximately one week. Due to a delay in access to the training, Kendra did not complete this phase.

Alternating Treatment Design: Support

When the educators were introduced to the alternating treatment phase (Support), the researcher prompted: "Please use what you have learned to implement dialogic reading during your

reading times. This schedule will tell you if you use a scripted book or the bookmark." A schedule was created for each educator with educator pairs being on opposite schedules. One educator's schedule was determined through a coin flip, and the other's was the opposite sequence. Therefore, one educator used the scripted book and the other used the bookmark/checklist. The scripted books, bookmark, and schedule were provided in a folder given to the educator pairs.

DR Checklist. During this portion of the alternating treatment design, the educators were provided a laminated, 11 in x 3 in checklist on a bookmark with the PEER and CROWD acronyms (see Appendix A) and instructed to hold the bookmark during readings.

DR Scripted Prompts. The scripted prompts consisted of a CROWD prompt attached to the top of a page with possible elaborations. At least one of each CROWD prompt was used throughout the scripted books. If the educators utilized each scripted prompt, they would demonstrate fidelity for each prompt as well as the Elaborate portion of PEER (see Appendix C).

Results

Results were analyzed through visual analysis of level, trend, and variability. Effect size was determined through Tau-U calculations to account for overlap in data to determine effect. For the baseline phase of the study, Rebecca's use of DR (Figure 1) ranged from 0-25% intervention fidelity (M = 10%) and following training she ranged from 0-62.5% intervention fidelity (M = 41.07%, ES = 0.8). The level of intervention fidelity increased for Rebecca but remained at moderate levels of intervention fidelity with variability. Rebecca completed part of the alternating treatment phase. The two supports do not demonstrate adequate differentiation to determine an effect. As there was not full data collection, the downward trend for the checklist (M = 75%) cannot be confirmed. The script demonstrated high levels of fidelity after the first data point (M = 87.5%), but the overlap between the two demonstrated a small effect size (ES = .25). Use of DR ranged

from 37.5-87.5% intervention fidelity (*M* = 75%, *ES* = .25) for the final phase of the study. Compared to the training phase, Phase C has a higher level than Phase B; however, there is still overlap.

While the level was low, the data were variable for the baseline phase for Taylor's use of DR (Figure 2) ranging from 25-75% intervention fidelity (*M* = 47.5%). Taylor demonstrated the highest level of intervention fidelity in baseline; however, a descending trend appeared in baseline. Use of DR ranged from 75-100% intervention fidelity (*M* = 87.5%, *ES* = 0.933). While intervention fidelity reached 100%, data for Taylor has a marked descending trend. Taylor completed part of the alternating treatment phase. The two supports do not demonstrate adequate differentiation to determine an effect, and there was complete overlap with Phase B. The checklist (*M* = 87.5%) and script (*M* = 87.5%, *ES* = 0) mirror each other. Overall, in Phase C, use of DR ranged from 75-100% intervention fidelity (*M* = 87.5%, *ES* = 0) with much overlap.

Barry's use of DR (Figure 3) ranged from 0-37.5% intervention fidelity in baseline (*M* = 12.5%). Barry demonstrated low levels of intervention fidelity with some variability in their data, and this educator demonstrated 0% fidelity at the end of the phase. After training, Barry's fidelity raised in level with low variability. Use of DR ranged from 50-87.5% intervention fidelity (*M* = 62.5%, *ES* = 1). Overall, in Phase C, use of DR ranged from 50-100% intervention fidelity (*M* = 76.25 %, *ES* =.56) for the final phase of the study. For Barry, the two supports do not demonstrate adequate differentiation to determine an effect. The checklist (*M* = 80 %) and script (*M* = 72.5 %, *ES* = .06) have significant overlap. Compared to the training phase, Phase C overlaps with Phase B to some degree, but the level of Phase C is higher than Phase B.

Kendra's use of DR (Figure 4) ranged from 0-37.5% intervention fidelity at baseline (*M* = 17.5%). Kendra also demonstrated low levels of fidelity and ended the phase with 0% fidelity. Kendra did not complete Phase 2 due to the study's time constraints. Kendra completed part of the alternating treatment phase. The checklist (*M*

= 84.38%) and the script (*M* = 97.5 %, *ES* = .04) overlap significantly. Overall, in Phase C, use of DR ranged from 62.5-100% intervention fidelity (*M* = 91.67%, *ES* = 1) compared to the baseline phase. Phase C is higher in level than the baseline phase, but, without Phase B, this could be due to training alone.

Social Validity

Educators completed social validity measures for supports (i.e., the checklists and scripts) using the Intervention Usage Rating Profile (URP-I; Briesch et al., 2013) to determine acceptability (see Table 1). The URP-I includes 29 questions concerning treatment efficacy and acceptability with an internal consistency reliability ranging from .88-.98 (Lane et al., 2009). Ratings are from 1 (strongly disagree) to 6 (strongly agree) for statements like: "This intervention is an effective choice for addressing a variety of problems." Neither support (checklist or script) was consistently rated more highly than the other, and differences between them are minimal with all educators endorsing an average rating over 4 ("Slightly Agree"). Educators 1, 3, and 4 did not answer all questions on the survey so their average rankings were only taken from the questions that were completed. The researcher followed up with an informal discussion of the study. When asked which support was preferred, all four educators reported the checklist over the script. One educator noted the inflexibility of the scripts, and another was concerned about the scripts being repetitive.

Method: Study 2

The third research question, concerning child outcomes under the checklist condition, was addressed in Study 2. Improved child outcomes for early literacy skills would provide additional evidence that increasing intervention fidelity is an important consideration for DR. Study 2 was conducted to determine if the intervention was more effective with increased fidelity, and therefore meaningful to address in real-world intervention implementation.

Table 1

URP-Intervention ratings

		Rebecca	Taylor	Barry	Kendra
Checklist	Total Score	91	120	111	96
	Average Rating	4.33	4.29	4.83	4.17
Script	Total Score	93	114	110	99
	Average Rating	4.23	4.07	4.78	4.30

Table 2

Book Target Vocabulary List

Book	1	2	3	4	5	6	7	8	9	10
Do Like Kyla	Mirror	Footsteps	Page	Jar	Store	Braid	Oatmeal	Snow boots	Window	Apron
I Took My Frog to the Library	Frog	Desk	Hen	Pelican	Python	Giraffe	Hyena	Elephant	Librarian	Home
A Pocket for Corduroy	Laundro mat	Soap	Chair	Towels	Beret	Bear	Overalls	Sketch pad	Cage	Card
Sheep in a Shop	Sheep	Pockets	Clock	Box	Stack	Piggy Bank	Rackets	Ribbon	Pennies	Wool

Figure 1

Percent Intervention Fidelity: Rebecca

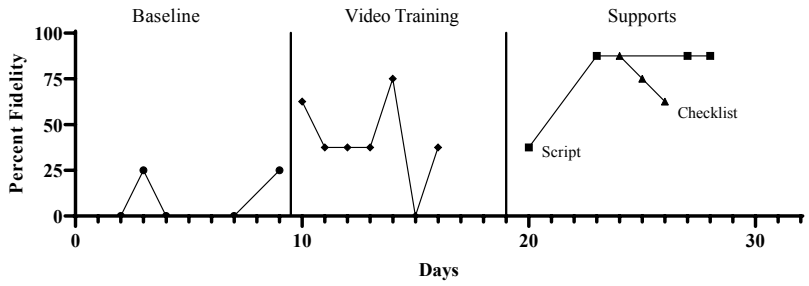


Figure 2

Percent Intervention Fidelity: Taylor

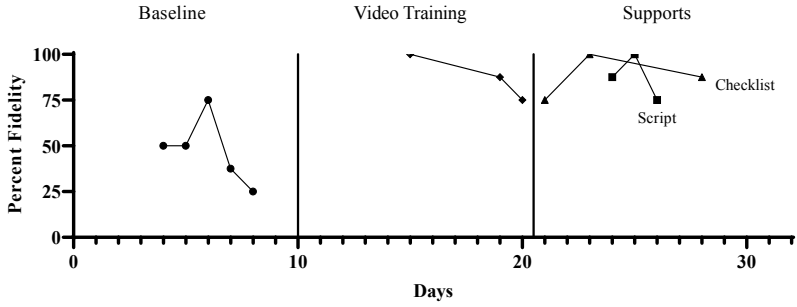


Figure 3

Percent Intervention Fidelity: Barry

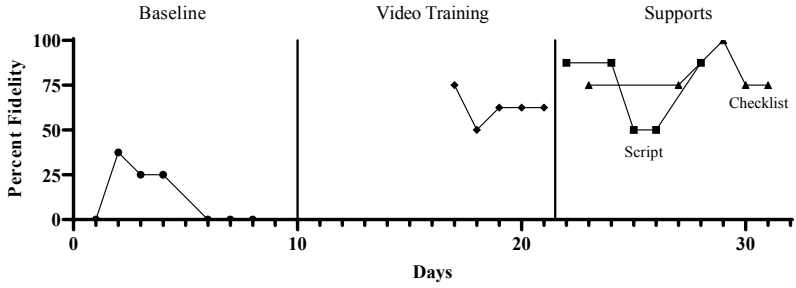


Figure 4

Percent Intervention Fidelity: Kendra

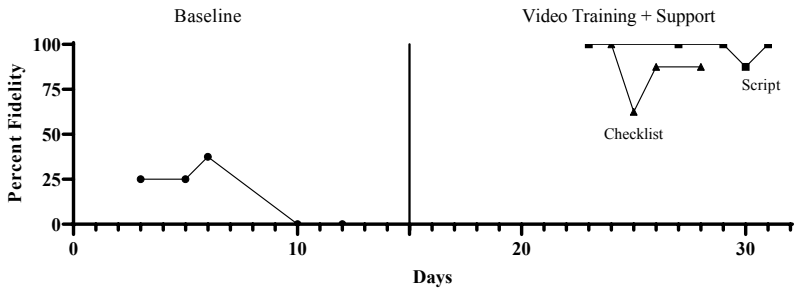
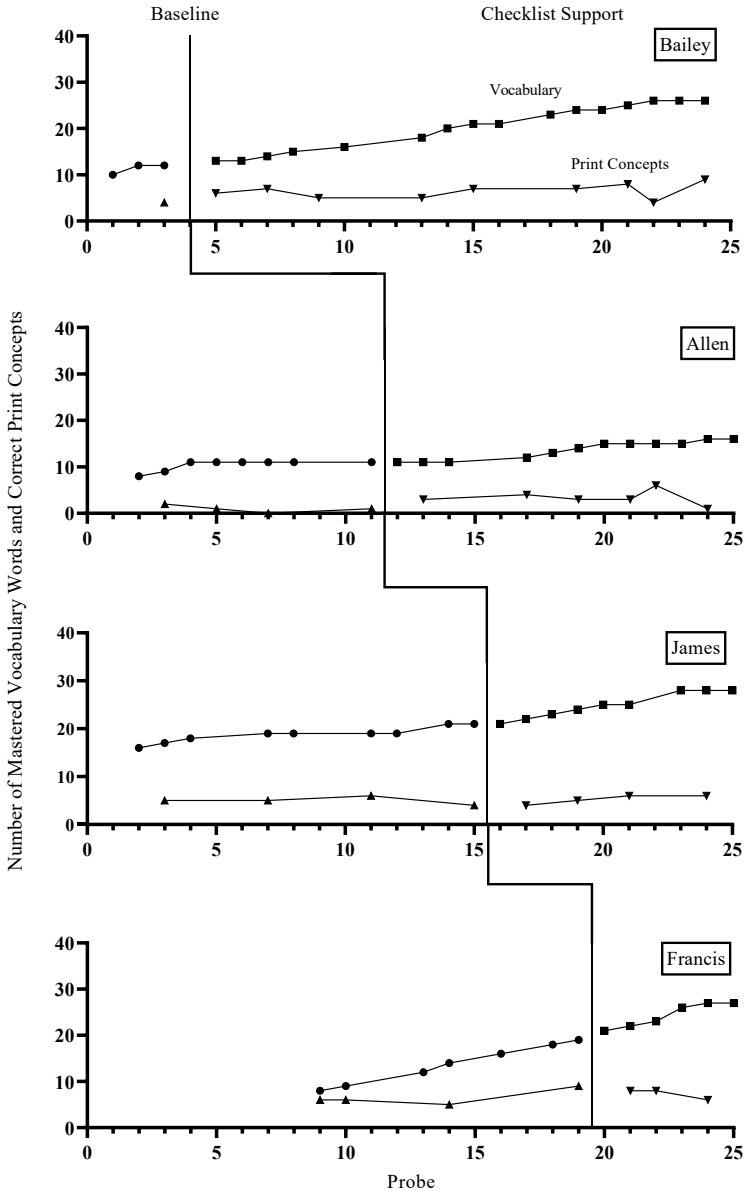


Figure 5
Vocabulary Mastery and Print Concepts



Participants and Setting

Four children from the same preschool center used in the first study were selected by the same educator participants from Study 1, who agree to continue serving as interventionists. The children's parents were informed of the opportunity for additional book reading time for their child, and children whose parents consented to their participation were screened. Children identifying 25% or less of pictures of target book vocabulary were eligible for the study (Coogle et al., 2018). Each educator ($N = 4$) was paired with a target child for the second study. Bailey was a four-year-old, White female who had not previously attended preschool. Allen was a three-year-old, Korean male who had not previously attended preschool. His home language was Korean and he was learning English during his time in preschool. James was a three-year-old, biracial male who had not previously attended preschool. Francis was a four-year-old, White male who had attended the preschool the previous year. All child participants are identified with pseudonyms.

Materials

A new set of books indicated as appropriate texts to engage in DR with preschoolers (Zevenbergen & Whitehurst, 2003) were provided to the educators. These books had limited amounts of text and large pictures including *Do Like Kyla* (Johnson, 1990), *Sheep in a Shop* (Shaw, 1991), *A Pocket for Corduroy* (Freeman, 1978), and *I Took My Frog to the Library* (Kimmel, 1990).

Dependent Variables

Target Vocabulary

The researcher selected ten target vocabulary words from each book (Table 2). Vocabulary words were both mentioned in the text and represented by a picture in the book. Children's knowledge of vocabulary words was assessed bi-weekly. Each participant was assessed individually by being asked, "What's this called?" as the

researcher pointed to the picture representing the vocabulary word from the book on a PowerPoint slide. If the participant correctly labeled the picture within 5 seconds of the prompt, the word was considered "known," and if labeled correctly in three concurrent data collection sessions, it was considered "mastered." Once a participant mastered a vocabulary word, the word was removed from the assessment. This variable was the main decision-making variable for the study.

Print Concepts

Participants' print concepts knowledge was assessed weekly with the Concepts of Print Assessment (CPA; Lovelace & Stewart, 2007), a 20-question measure adapted from Clay's Concepts About Print for use with non-reading children for accessibility and equity reasons. The CPA asks questions like "Show me the title of the book" and "Show me where the book begins."

Inter-Observer Agreement

For target vocabulary words and print concepts, graduate students in a school psychology program were trained in the data collection procedures through a script and training video. Initial IOA was collected from a training video, and if they reached 85% agreement with the researcher on the training video, they could begin collecting data for the study (Kennedy, 2005). IOA was collected virtually through an online meeting program for approximately 48% of data collection sessions across phases. All data collectors remained above 85% IOA with an average of 95.6% for the vocabulary measure and 92.2% for the print concepts measure.

Procedure

After identifying children, gaining parental consent, and pre-assessing vocabulary, educators were given a set of the four books to read to child participants, with one book read daily. Implementation of DR with no supports began (Baseline). Once

the first participant demonstrated steady responding over at least three data collections, the next phase began (i.e., checklist support), and their educator was given the checklist to read with the child during every session. The same group of books were read in this condition. The second, third, and fourth participants followed a similar trajectory within the multiple baseline design.

Results

Vocabulary Mastery

Again, results were analyzed through level and trend with Tau-U calculated for effect size from baseline to intervention. While level, trend, and variability are the three major areas of visual analysis, variability is not discussed in this section as variability in vocabulary mastery, as defined in the study, should not be present. Bailey demonstrated a low level of mastered vocabulary and a slightly increasing trend during baseline (M = 12) for vocabulary mastery as seen in Figure 5. During the intervention phase, the trend increased in slope (M = 21.36, ES = 1) with an overall higher level. Allen showed an initially increasing trend during baseline that leveled off towards no increase (M = 10.38) and had a low level for vocabulary mastery. During the intervention phase, the trend increased in slope after initial no increase with an overall higher level of vocabulary mastery (M = 13.67, ES = .81). James showed an initially increasing trend during baseline that leveled off towards no increase (M = 18.78) for vocabulary mastery with a higher level of initial mastery than the other participants. During the intervention phase, the trend increased in slope with an overall higher level of mastery (M = 24.89, ES = .97). Finally, Francis demonstrated a steadily increasing trend in baseline with a low level of initial vocabulary mastery (M = 13.71) which continued in the intervention phase (M = 24.33, ES = 1). A higher level of mastery was noted in the intervention phase.

Print Concepts

Print Concepts is a measure of participants' knowledge of books and features of books. Bailey's level of knowledge slightly increased in print concepts from baseline ($M = 5$) to intervention ($M = 6.5$, $ES = .56$) with a moderate effect size, though data are variable and only one baseline point was collected. Allen increased in print concept knowledge from baseline ($M = 1$) to intervention ($M = 3.4$, $ES = .8$) with a large effect size. Figure 5 shows an increasing trend in the data; however, this change is, overall, small. James demonstrated negligible progress from baseline to ($M = 5$) to intervention ($M = 5.25$, $ES = .19$) as seen in the level and trend of the data. Francis increased in print concept knowledge during the baseline period ($M = 6.5$) and remained stable in the intervention with no increase ($M = 7.33$, $ES = .33$).

Intervention Fidelity

Intervention fidelity was measured throughout the study with the same checklist as Study 1 (Appendix B) by a graduate student trained on the protocol in Study 1. Intervention fidelity was collected weekly for each educator for approximately 19% of baseline intervention days and 21% of supported intervention days. Mean intervention fidelity was low during the baseline phase for each educator. Mean intervention fidelity increased for each educator during the checklist support phase of the intervention, converging with findings from Study 1.

Discussion

Study 1

In Study 1, the researchers examined the effects of intervention supports (i.e., a checklist and scripted prompts), on educators' intervention fidelity while implementing DR. Data indicated that both the checklist and scripted prompts supported increased intervention fidelity, and both were endorsed as socially valid. These findings support the study's first hypothesis, that DR bolstered

by a checklist would encourage higher levels of intervention fidelity than an unsupported condition. Findings partially support the second hypothesis, that the script would encourage higher fidelity than no supports. However, the hypothesis that scripted prompts would be superior to a checklist was not supported even though following the scripted prompts would have led to teachers completing at least seven of nine fidelity steps. Although DR research has examined the effects of scripts on intervention fidelity (Towson et al., 2016), no prior research has examined the effects of a checklist support or compared intervention scripts to other supports. This study expands the DR literature and opens additional avenues of research to support intervention fidelity, as is discussed in the Future Research section.

Social Validity

Educators endorsed positive ratings of both intervention supports, but the checklist was preferred by all four educators due to its flexibility. One educator expressed preference for the checklist over the repetitive nature of the scripted prompts, and their potential negative impact on children's interest levels during reading. This was reflected in the scripts not being fully followed (there was lower than 78% fidelity in some observations). It is possible that this perception is indicative of a mismatch between the direct intervention supports and the constructivist instructional framework of the preschool, which is associated with the educators' interest in engaging children in a way that speaks to each child's interests. A set script may not allow the flexibility for the educators to reference the child's interests and engage each child in a differentiated way.

The checklist preference may also reflect a disconnect between researcher prompts and educator prompts. The researcher developed prompts to mitigate time constraints on the educators and to simply examine the effects of the supports on intervention fidelity. Hawkins et al. (2008) recommended consulting with

educators concerning procedures of interventions to build agency of the educators in the process, and this process would include development of intervention scripts. If the scripts were developed in collaboration with the educators, the educators might have had a greater sense of ownership of the intervention script, perhaps increasing their preference for scripts. However, such procedures would incur an additional time commitment to the intervention, which could ultimately decrease acceptability.

Study 2

With neither support demonstrating superior comparative benefits, educators were asked to choose a support for Study 2. The checklist support was preferred by all educators, and subsequently applied during Study 2 to examine the effects of child outcomes under a no support baseline DR condition and a DR checklist condition. Both the checklist condition and the script condition promoted high intervention fidelity, and therefore the application of a checklist was deemed appropriate for Study 2. Selecting intervention components should include considerations of what is most likely to work and preference-consideration for interventionists, which can influence implementation fidelity (Dart et al., 2012).

Data partially supported the hypothesis that DR, when implemented with checklist supports, would increase child vocabulary. An increase in trend was noted for book vocabulary from baseline to intervention, but not for print concepts. The increase in child vocabulary growth when the support was implemented is consistent with previous studies such as Whitehurst et al. (1994), which demonstrated less growth when interventionists implemented DR with low levels of fidelity. Intervention fidelity was low in the baseline period of the present study even though the educators had experience with DR from Study 1. However, the educators' levels of intervention fidelity in baseline is higher than the baseline in Study 1, showing a possible practice effect. This still

suggested that the supports were helpful in boosting intervention fidelity higher than in baseline, although an optimal level of intervention fidelity (85% or higher) was not reached. Moreover, these findings support the idea that intervention fidelity can be maintained over time instead of drifting (Zibulsky et al., 2019).

Although DR is considered effective for increasing child print concepts (Whitehurst et al., 1994), Study 2 did not result in a notable change in print concepts across the four participants. One reason for the lack of change may be a difference in the measure used in this study versus prior research. Whitehurst et al. (1994) utilized the Developing Skills Checklist as a pre- and post- test measure, whereas the present study included a measure derived from Clay's Concepts of Print to probe the skill weekly. These measures may differ to the extent that they measure different aspects of print concepts and were utilized in different ways. However, the NELP (2008) considers oral language, vocabulary included, as one of the best predictors of reading success later in a child's schooling. Therefore, although the study does not show growth in print concepts, this skill is also less predictive of later success.

Taken together, the results of these two studies provide further evidence that DR is an effective intervention, and that high intervention fidelity results in improved growth for child outcomes. Without the DR supports provided in this study, children may not receive the intervention as intended. The studies support the overall need for intervention fidelity supports for high quality interventions (Sanetti & Collier-Meek, 2019).

Implications

The study has implications for practitioners providing DR interventions, or consulting with educators and other staff on early reading interventions. To close the literacy gap (NELP, 2008), empirically-supported interventions that are implemented with fidelity are needed. Early childhood educators and those providing consultative supports must choose appropriate interventions such

as DR to respond to children's literacy gaps. Beyond selecting a strong intervention such as DR, ensuring implementation fidelity is critical. There is limited time in the school day for children to develop skills, and the most time-efficient and effective form of an intervention should be implemented. Supports like a checklist require little time to develop and implement but support higher levels of implementation fidelity and, in turn, increased child learning. The present study offers a practical example of a checklist and script which can be used by practitioners to support DR implementation.

Limitations

Although the study adds to the literature on DR, it is not without limitations. Educators informally expressed a preference for checklists, though social validity scores did not indicate this preference, perhaps due to the researcher's connection to the educators and school. While the researcher limited discussion of the study with the educators, the researcher had worked with the educator participants in prior projects which may have influenced social validity ratings. This limits the social validity measure utilized, and the choice of the checklist over the script when interviewed may reflect the true social validity of the supports.

Given school closures from COVID-19, a limited number of data points could be collected in each phase, and not all phases for all participants have five data points for both studies. Each phase has at least three data points, which is acceptable in single-case design research, though not ideal as additional data points would help further indicate intervention effects (Kennedy, 2005). The second study is also limited in that the fourth participant did not have a steady baseline trend established before the checklist was implemented, making it difficult to determine how the checklist condition impacted that participant. Additionally, data like vocabulary mastery does not have variability and may not be as well represented by a single case design. Also due to COVID-19,

the preschool setting had smaller than normal class sizes of six to nine children, and it is not clear if this intervention is as feasible with larger classes. The setting was a specialized, constructivist preschool with time allotted for one-on-one child and educator interaction, which is not available in every setting where DR might be performed. Finally, the sample of educator and children does not match every child's experience, limiting the generalizability of the findings.

Future Research

To further develop this research, additional studies should examine intervention supports for DR in other contexts. This study focused on DR in the constructivist preschool context; however, DR interventions could be delivered in the home, in clinics, or in traditional school settings. Although educators in this setting preferred the checklist, parents with less expertise in early literacy may prefer having a scripted intervention. Additionally, supports like checklists or prompts could provide valuable additions to intervention fidelity for other school-based interventions beyond DR; exploring their potential applicability would be fruitful.

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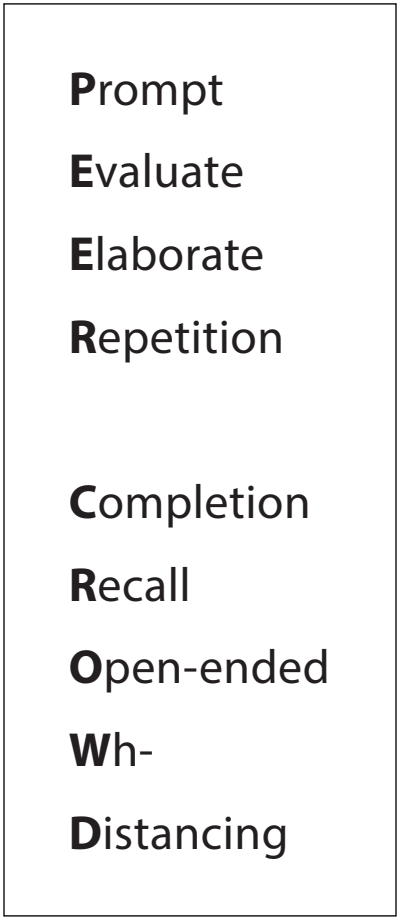
Appendix A
Checklist Bookmark



Appendix B
Fidelity Data Sheet

Tally occurrences of PEER and CROWD by the educator during the reading. Record beginning and end time of reading and educator reading.

Begin: ____:____End: ____:____Date: _____

Educator: _____

Prompt (see below)

Completion (I see a ____ looking at me)

Recall (How big was Clifford when Emily got him?)

Open-ended (Tell me how the people feel.)

Wh- (Who took the keys?)

Distancing (When was a time that you shared like Rainbow Fish?)

Evaluate

Elaborate

Distance

Appendix C
PEER and CROWD procedures adapted from Whitehurst & Zevenbergen, (2003)

	Definition	Examples
Prompt	A question or statement that directs children to label objects in the story.	"Tell me about this picture." "What will he do?" "When did you feel like Corduroy?"
Evaluate	A statement that provides performance feedback for a prompted statement.	"That's right, the bear is in the child's arm." "Let's look again, what color is this?"
Elaborate	Any word addition to a child's original statement.	Child: "They are in a laundry." Reader: "They are in a ***busy*** laundry."
Repeat	A prompt for children to repeat a corrected or elaborated sentence.	"Say it with me: He is a stuffed bear." "Look, he wears ***green*** pants. What color pants?"
Completion	Any prompt where part of the statement is omitted.	"She wants to be like____." "Harry got a _____." "The sheep are in a ____."
Recall	Any prompt that requires the children to respond with information from a previous page.	"Who took the caps?" "Where was Corduroy left?"
Open-ended	Statements that prompt the children to respond to the pictures or story in their own words.	"Tell me what you see." "Tell me about the page." "Tell me how Harry feels."
Wh-	What, Where and, Why questions that do not fall under the other CROWD definitions.	"What does Harry think about the sweater?" "Where is Corduroy?"
Distancing	Prompts that require children to relate book content to the real world.	"When did you feel like Corduroy?" "Have you ever copied someone like Kyla and her sister?"