AN ECOBEHAVIORAL ANALYSIS OF TEACHER AND CLASSROOM FACTORS INFLUENCING PRESCHOOLERS' LITERACY ENGAGEMENT

By

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ABSTRACT

Student engagement has been found to be an important indicator of high quality instruction and has served as a focus for improving learning outcomes in the elementary grades. Engagement has similarly been used as an index of instructional quality in preschool. This study focuses specifically on teacher and classroom factors that may increase children's literacy engagement. Participants of this study were selected from preschool classrooms that participated in an Early Reading First (ERF) program serving low-income children in a Midwestern urban area. The ERF program provided extensive professional development focused on enhancing teachers' instructional early literacy practices in nine preschool classrooms. Two out of the nine classrooms were chosen for this study based on teachers' fidelity of implementation of a set of ERF literacy practices. Ecobehavioral Assessment (EBA) was conducted to examine the differences in the amount of early literacy instruction in classrooms with High Fidelity (HF) versus those with Low Fidelity (LF) during small group and center time. EBA was also conducted to examine whether or not children would demonstrate higher levels of literacy engagement when they were in classrooms with greater amounts of literacy focus than when they were in classrooms with low literacy focus. Preliminary findings indicated that teachers in HF classrooms spent more time in literacy instruction than teachers in LF classrooms during small group time. All children demonstrated higher amounts of literacy engagement during small group time compared to center time. Implications of these findings are discussed in terms of modifying instruction to increase children's literacy engagement and to improve their learning outcomes in literacy.

Keywords: Early Literacy, Engagement, Ecobehavioral Analysis, Early Reading First

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INTRODUCTION

Children's early literacy experiences during the preschool years are a strong influence on their later reading and academic behavior in the elementary grades (Whitehurst & Lonigan, 1998). Young children who are from low-income families often have limited literacy and language experience, and may exhibit delays in early literacy skills (Arnold & Doctoroff, 2003; Justice, Mashburn, Hamre, & Pianta, 2008; Massetti, 2009; Scarborough, Dobrich, & Hager, 1991). To decrease the academic achievement gap between children from low-income families and children from middle- or high-income families, preschool programs have provided professional development that helps teachers learn how to enhance children's early literacy skills (Gettinger & Stoiber, 2008; Landry, Anthony, Swank, & Monseque-Bailey, 2009; Morrow, 2001). Thus, increasing children's engagement in early literacy has become an important pathway toward school readiness in preschool programs, especially for preschoolers who are from low-income families.

Preschoolers are more likely to engage in early literacy activities when teachers provide high quality instruction throughout the day by implementing evidence-based and developmentally appropriate activities with high fidelity and at adequate levels of intensity. To enhance teachers' quality of literacy and language instruction, early literacy-focused programs, such as Early Reading First (ERF), provide literacy-focused Professional Development (PD) to help preschool teachers learn how to arrange instruction to increase children's engagement in early literacy. Early literacy skills targeted for the PD are often those identified as strong predictors of early reading such as alphabet knowledge (AK), phonological awareness (PA), oral language (OL), or vocabulary (Abbott, Atwater, Lee, & Edwards, 2011; Campbell, 1998; Lonigan & Philips, 2007; Senechal & LeFevre, 2002). The purpose of literacy-focused PD is to

increase teachers' conceptual knowledge of those early literacy skills as well as support their use of effective instructional strategies during literacy instruction (Abbott, 2011). To fulfill this purpose, both ongoing workshops and in-class coaching are often used to help teachers learn these strategies.

To examine whether PD promotes teachers' use of effective instructional strategies in classroom settings, researchers have measured teachers' fidelity of implementing language and literacy instruction (Justice, Mashburn, Hamre, & Pianta, 2008; Landry et al., 2009; Pence, Justice, Wiggins, 2008). In these studies, fidelity of implementation is often measured by the use of checklists that describe critical components of what teachers should implement during literacy instruction (Fixsen, Naoom, Blase, Friedman & Wallace, 2005; Mowbray, Holter, Teague, & Bybee, 2003). The quality and quantity with which teachers implement those critical components are then measured to record and serve as indices of how well teachers have learned the instructional strategies that were targeted in the PD.

To determine whether PD improves teachers' literacy and language instruction, it is important to examine the relationship between teachers' fidelity of implementation of instructional strategies and the quality of their instruction. However, few studies have examined the effect of literacy-focused PD on improving preschool teachers' fidelity and quality of literacy and language instruction. Even fewer studies have examined the correlations between teachers' fidelity of implementation and their quality of language and literacy instruction. Thus, this study examined the influences of long-term PD on teachers' fidelity of implementing language and literacy instruction as well as their quality of implementing the instruction by conducting an Ecobehavioral Assessment.

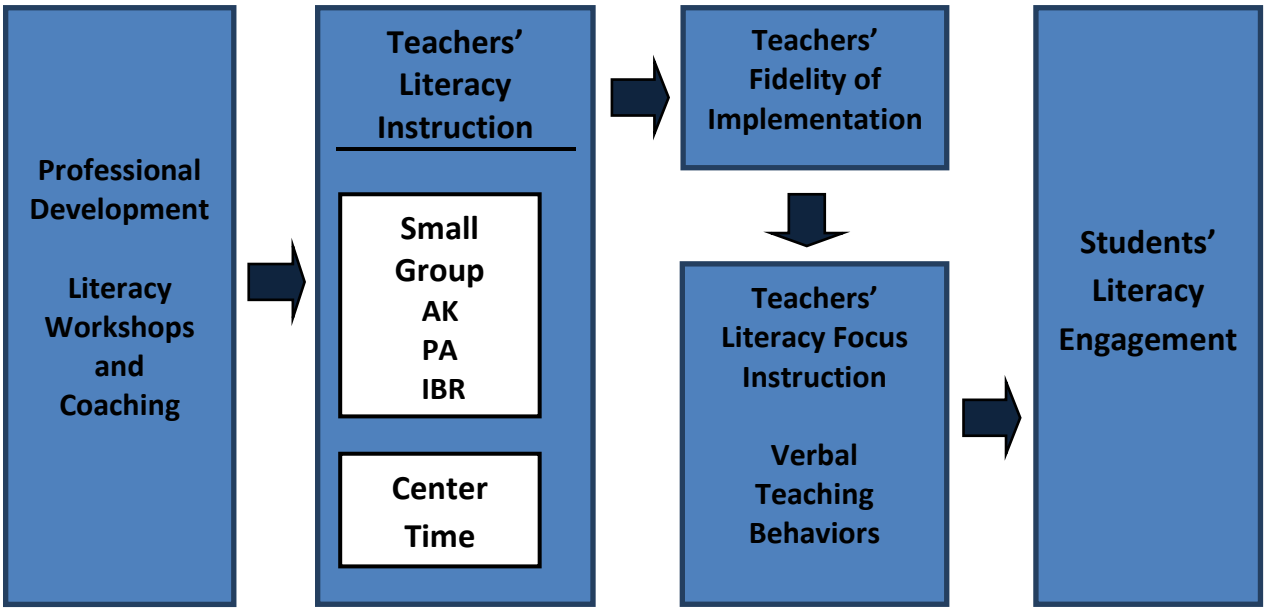
Ecobehavioral Assessment (EBA) is an observational method used to measure children's behavior in the context of specific classroom arrangements and in response to teachers' instruction. One particular focus in many EBA studies is academic engagement. Greenwood, Horton, and Utley (2002) defined academic engagement as a "composite of specific classroom behaviors such as writing, reading aloud, reading silently, and talking about academics." To measure the level of teachers' literacy instruction and children's academic engagement, researchers observed their academic behaviors and interactions between teachers and children in elementary and secondary school settings. Applying EBA to children's academic engagement, Greenwood and colleagues (1984) used EBA to identify specific classroom environmental factors influencing the occurrence of academic behavior. They used this information in subsequent intervention studies to design practices and to manipulate classroom environmental factors that resulted in increasing levels of academic engagement and promoting student achievement (Arreaga-Mayer, 1998; Greenwood, Arreaga-Mayer, & Carta, 1994; Greenwood, Carta, Arreaga, & Rager, 1991; Greenwood, Carta, Kamps, Terry, & Delquadri, 1994; Greenwood, Delquadri, & Hall, 1989). However, to this point, no EBA analyses have been conducted to examine early childhood teachers' literacy instruction and its relationship to preschoolers' engagement in early literacy activities. In this study, EBA was used to measure the level of preschool children's literacy engagement and the teachers' literacy instruction during small group and center time.

Conceptual Framework of This Study

This study examines the level of children's literacy engagement as a function of changes in preschool teachers' literacy instruction brought about by the Early Reading First (ERF) program. ERF provided Professional Development (PD) through literacy workshops and

intensive coaching that aimed to enhance teachers' literacy instruction in Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR). My hypotheses were: (1) teachers who implemented the ERF literacy strategies in small group and center time would spend more time in literacy-focused instruction and would engage in more verbal behavior; and (2) children whose teachers implemented the ERF strategies and whose teachers spent more time engaged in literacy-focused instruction would demonstrate higher levels of active literacy engagement. As shown below, the conceptual framework displays the key constructs of this study and the theory of change that supports the research questions in this study.

Conceptual Framework



PD in the ERF program included ongoing literacy workshops and supports from literacy coaches. Through this intensive PD, teachers received training in instructional strategies focused on increasing children's early literacy skills (e.g. alphabet knowledge, phonological awareness,

and interactive book reading) that could be implemented during small group and center time. To determine whether teachers implemented these instructional strategies, a fidelity implementation checklist was used. This study predicts that teachers will provide greater amounts of literacy instruction if they are high fidelity implementers of the instructional strategies they have been taught in PD. Additionally, the last part of the framework indicates that the level of teachers' literacy instruction and the fidelity of implementation may influence children's literacy engagement. Thus, this study examines the differences in the level of teachers' literacy instruction and children's literacy engagement in two classrooms which are divergent in the fidelity of implementation. Following this framework, research questions are posed regarding whether teachers who implement high fidelity (HF) instruction spend more time in the literacy-focused instruction than teachers who implement low fidelity (LF) instruction. Children in the classroom with HF teachers are also expected to spend more time in literacy engagement than children in the classroom with LF teachers.

Research Questions

The purpose of this study is to carry out an ecobehavioral analysis to investigate classroom factors influencing children's literacy engagement during small group and center time. The Classroom Code for Interactive Recording of Children's Learning Environments (Classroom CIRCLE version 2.0, Atwater, Lee, Montagna, Reynolds, & Tapia, 2009), an ecobehavioral observation measure for preschool-aged children, was selected to conduct this research in ERF classrooms. The first two primary research questions focus on the measurement of the level of teachers' literacy instruction and verbal teaching behaviors. Two classrooms were purposively selected according to teachers' level of fidelity of implementation scores, so the unit of analysis for the first two research questions is a classroom that included three teachers in the unit. Each

research question includes three sub-questions focusing on the differences in HF versus LF classroom teaching teams in the literacy instruction and verbal teaching behaviors across small group and center time. The third primary research question focuses on the level of literacy engagement of children from HF and LF classroom teaching teams, comparing differences in the amount of time spent in literacy engagement.

Research questions of this study are addressed:

1. Overall, how did time spent focused in literacy instruction compare in center time versus small group instruction and did classroom teaching teams divergent in their fidelity of implementation [i.e., high fidelity (HF) versus low fidelity (LF)}, provide correspondingly different amounts of literacy instruction?
    1) During center time, did the HF classroom teaching team spend more time in early literacy instruction than did the LF classroom teaching team?
    2) During small group instruction, did the HF classroom teaching team spend more time in early literacy instruction than did the LF classroom teaching team?
    3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did the HF classroom teaching team spend more time in early literacy than did the LF classroom teaching team?
2. Overall, how did time spent focused engaged in verbal teaching behaviors compare in center time versus small group instruction, and did classroom teaching teams divergent in their fidelity of implementation [i.e., high fidelity (HF) versus low fidelity (LF)], produce correspondingly different patterns of verbal teaching behaviors?
    1) During center time, did the HF classroom teaching team spend more time in verbal teaching behaviors than did the LF classroom teaching team?

2) During small group instruction, did the HF classroom teaching team spend more time in verbal teaching behaviors than did the LF classroom teaching team?
3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did the HF classroom teaching team spend more time in using verbal teaching behaviors than did the LF classroom teaching team?

3. Overall, do children with teachers divergent in the fidelity of implementation, high fidelity (HF) versus low fidelity (LF), exhibit correspondingly different levels of literacy engagement in center and small group instruction?
    1) During center time, did children in the HF classroom spend more time in literacy engagement than did children in the classroom with LF teachers?
    2) During small group instruction, did children in the classroom with HF teachers spend more time in literacy engagement than did children in the classroom with LF teachers?
    3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did children in the classroom with HF teachers spend more time in literacy engagement than did children in the classroom with LF teachers?

Definitions of the Key Terms

Literacy Focus of Instruction: In this study, teachers conducted literacy instruction to increase children's early literacy skills such as alphabet knowledge, phonological awareness, and vocabulary. In the Classroom CIRCLE, the codes used for recording teachers' literacy instruction were selected from the 'Focus of Instruction' category. This category includes six codes: phonological awareness, alphabet concepts, comprehension-story, comprehension-other, vocabulary, and reading. All of these codes were combined to measure the number of intervals that teachers were observed in literacy focus of instruction during small group and center time.

Verbal Teaching Behaviors: In this study, teachers' verbal behavior during literacy instruction was measured using a combination of all CIRCLE codes for Teacher Verbal Response. These include: positive feedback, expansion/repetition/extension, open-ended question, and reading/reciting. The numbers of intervals teachers were observed engaged in these behaviors were combined as a composite variable.

Literacy Engagement: In this study, literacy engagement consists of a composite of four literacy-related behaviors captured on the Classroom CIRCLE: writing, reading words/letters aloud, academic manipulations, and academic verbal response. The percentage of the number of intervals observed for the composite variable is recorded by the use of Classroom CIRCLE to measure the amount of time that the child was engaged in literacy activities during teachers' instruction.

Fidelity of Implementation: The level of teachers' fidelity of implementing ERF instructional practices was used to select participating classrooms for this study. Teachers' fidelity of implementing instructional practices was examined to determine how well teachers provided early literacy instruction following their lesson plan and using the instructional

strategies acquired from professional development. Teachers' fidelity of implementation is measured by using the fidelity checklist during four designated activities (e.g. center time, circle time, small group and story time).

Literature Review

Literacy-Focused Professional Development

Intensive PD has been effective in enhancing teacher knowledge and instructional practices (Landry, Swank, Smith, Assel, & Gunnewig, 2006; Neuman & Cunningham, 2009; Podhajski & Nathan, 2005). As preschool programs focus on increasing children's language and early literacy skills such as alphabet knowledge (AK), phonological awareness (PA), and vocabulary, PD has played an important role in providing workshops and supports for teachers to improve the quality of language and literacy instruction (Ramey & Ramey, 2008; Abbott, 2011). A prime example of a recent professional development initiative focused on early literacy was Early Reading First (ERF), a federally funded early literacy program designed to enhance teachers' implementation of language and literacy instruction (McGee, 2008; Rinear, 2008; Walpole & Meyer, 2008). Through this and other literacy-focused PD programs, workshops and individualized support from literacy coaches have been found to enhance teachers' use of instructional strategies and have assisted teachers in embedding early literacy activities across classroom settings (Abbott et al., 2011; Girolametto, Weitzman, Lefebvre, & Greenberg, 2007; Hamre, Justice, Pianta, Kilday, Sweeney, Downer, & Leach, 2010).

Neuman and Cunningham (2009) examined the effect of literacy workshops and coaching on teachers' instructional practices of early literacy and found that teachers who received both training and coaching showed significant improvement in language and literacy practices. The study reported that training in the absence of coaching resulted in little improvement in practice. Another study examined the effect of intensive PD on enhancing teachers' writing instruction and literacy environment for children who came from low-income families (Clark & Kragler, 2005). In this study, teachers participated in five consecutive training sessions on writing practices and learned instructional strategies to encourage children to engage

in both reading and writing activities during center time. Results showed that all teachers improved their instructional behaviors in the use of literacy materials. Children also showed progress in their early literacy skills, writing letters and identifying the sound of letters. Girolametto and researchers (2007) also studied the effect of a two-day training program on promoting preschool teachers' use of emergent literacy strategies. Results of the study found that teachers who participated in the experimental in-service training improved their instructional behaviors in the use of abstract language and verbal print references. As these studies' findings suggest, even short-term PD has been shown to improve teachers' literacy and language instruction when the training focuses on a specific literacy topic such as writing, phonological awareness, alphabet knowledge, or oral language.

Although both short-and long-term PD influence the improvement of teachers' literacy instruction, research has shown that implementing high quality of literacy instruction depends on how intensively the PD supports the teachers to increase their use of instructional strategies and to encourage children to engage in literacy activities during instruction. Similarly, studies have documented that when teachers provide high quality literacy instruction as well as high fidelity of implementing instructional practices, children are more likely to engage in literacy activities and to increase their learning outcomes in early literacy. Intensive PD, which includes on-going literacy workshop and in-class coaching, has been shown to increase the likelihood that teachers will implement high quality of instruction (Justice et al., 2008; Rinear, 2008). Specific elements of PD found to enhance quality of instruction have been focusing each workshop on instructional practices linked to specific literacy skills (e.g. phonological awareness, alphabet knowledge, print awareness, and vocabulary) and training teachers in the use of instructional strategies to enhance the quality of instruction in these areas (McGee, 2008; Rinear, 2008). Studies have also

found that coaching also should be provided in the classroom to guide teachers' use of the instructional strategies learned from workshops (Walpole et al., 2008). Finally, studies have shown that long-term PD (compared to one-time workshops) provides more opportunities for teachers to focus on increasing their conceptual skills (e.g. asking literacy-related questions, using language facilitation strategies, and verbal teaching behaviors) related to early literacy as well as procedural skills (e.g. following steps in the lesson plan, preparing materials before lesson, and completing all activities as planned). Thus, as preschool teachers receive opportunities to learn teaching strategies and supports to provide high quality literacy instruction, they become more intentional about creating a literacy environment and using early literacy strategies in classroom settings.

High Quality Literacy Instruction and Fidelity of Implementation

The long-term early literacy PD focuses on helping teachers improve the quality of instruction by increasing their implementation of specific language and literacy practices that are known to increase children's learning outcomes. The literature on what constitutes quality in literacy instruction consists of studies examining the relationship between what goes on in the classroom and children's literacy outcomes. Quality of instruction is associated with how long and well the teacher provides instruction (Casbergue, McGee, & Bedford, 2008; Waxman & Padron, 1995). Researchers who have focused on the improvement of children's early literacy skills (e.g. alphabet knowledge, phonological awareness, and vocabulary) have reported that preschool children's engagement in literacy activities can differ according to the amount and the level of literacy instruction that they receive (Casbergue et al., 2008; Connor, Morrison, & Slominski, 2006; Justice & Kaderavek, 2004; Justice et al., 2008). When teachers spend a sufficient amount of time on language and literacy instruction by frequently using effective

language strategies and encourage children to engage in diverse literacy activities, preschoolers are more likely to engage in academic responding behaviors such as writing, reading, or naming letters.

Justice and her colleagues (2008) conducted a study to characterize the quality of language and literacy instruction provided by preschool teachers who serve children from low-income families. They referred to the quality of instruction as " a teacher's ability to work flexibly with students to differentiate instruction and respond sensitively to what they bring to the task, that is, to exhibit skilled performance within dynamic interactions with children in learning activities that unfold over time" (p.53). Importantly, this study identified the specific indicators of high quality of language and literacy instruction as the following: providing frequent conversation: promoting student-initiated language: and using open-ended questions, repetition and extension, self and parallel talk, and advanced language. The specific indicators of high quality literacy instruction were providing explicit and purposeful teaching of code-based characteristics of written language such as naming/pointing letters, and identifying the sounds of each letter (Justice et al, 2008). Thus, the quality of language instruction were those associated using language facilitation strategies and the quality of literacy instruction were those related to explicit and direct instruction focused on early literacy skills.

Similarly, Vukelich and Christie (2009) reported that one effective instructional practice in early literacy was the provision of explicit instruction which helps to develop preschoolers' early literacy skills such as phonological awareness (PA) and alphabet knowledge (AK). They found that explicit teaching of letter and their corresponding sounds requires the use of diverse instructional strategies such as modeling, direct teaching, guided practice, and independent practice. In addition, Justice et al. (2004) argued for the effectiveness of an explicit teaching

model of early literacy intervention that develops specific skills in literacy. They reported that explicit teaching of literacy can be effective in the acquisition of difficult concepts and skills (e.g. rhyming and phonics) because their teaching requires repeated, systematic, and scaffolded exposure to provide continuous learning opportunities for young children from low-income families. Thus, effective literacy instruction, which is explicit and developmentally appropriate, depends on the quality and the amount of teachers' language use and instructional behaviors that encourage children to engage in early literacy and language activities.

In determining how teachers provide instruction and promote the use of evidence-based practices, fidelity of implementation is an important indicator (Odom, 2009). The quality of implementation depends on the presence and strength of the planned activity and the extent to which the activity is purposeful and is sufficiently delivered by teachers (Fixsen et al., 2005; Mowbray et al., 2003). Exploring the critical components of a program determines the strength or fidelity of implementation of a program. By identifying unique features of the program that can differentiate it from another one, the primary aspects of fidelity can be linked to outcomes obtained through the implementation of the practice (Dusenbury, Brannigan, Falco, & Hansen, 2003; Greenwood, 2009). Thus, the effectiveness of an early literacy program will be evident when teachers implement the program as planned and produce positive learning outcomes. When the program is not conducted as planned, it is less likely to be effective (Fixsen et al., 2005; Yeaton & Sechrest, 1981). Common methods to quantify fidelity are rating scales conducted through interviews, observations, or surveys (Fixsen et al., 2005; Mowbray et al., 2003). Fidelity measurement in an early literacy program are better to be measured through observations to identify teachers' accurate use of the specific instructional strategies taught from PD and the

level of following implementation procedures as planned during the literacy instruction in classrooms.

Three aspects of measuring teachers' fidelity of implementation of intervention reported in the literature are dosage, adherence, and quality of delivery (Fixsen et al., 2005; Hamre et al., 2010). Similarly, in language and literacy instruction, teachers' fidelity of implementation have been characterized by: (1) the frequency of implementing the instruction (dosage); (2) the consistency and accuracy of providing instruction as written in the lesson plan (adherence); and (3) the quality of delivering specific language and literacy instructional strategies (Hamre et al., 2010). Hamre and other colleagues (2010) trained preschool teachers to use a literacy-focused curriculum during small group or whole group time and measured three aspects of fidelity of implementing the curriculum. They reported that, after the training in the use of a literacy-focused curriculum, teachers showed higher dosage and adherence in implementing the curriculum by increasing the frequency of its usage and following the general procedures written in the lesson plan. However, they reported that the teachers' quality of delivery in literacy and language activities was low, showing that teachers' use of language facilitation strategies or explicit instructional strategies were insufficiently provided during the instruction. Thus, supporting teachers in the implementation of high quality language and literacy instruction is a critical key to improve teachers' fidelity of implementing language and literacy instruction.

To measure teachers' fidelity of implementation in a literacy program, it is important to identify whether teachers' quality of instruction can be captured by their fidelity implementation. Justice et al. (2008) examined the level of preschool teachers' quality of language and literacy instruction by measuring their procedural fidelity of implementation of language and literacy curriculum. They found that while most teachers implemented the language and literacy

instruction at low quality, they were found to implement the prescribed curriculum with high procedural fidelity. They also found a low relationship between teachers' quality of instruction and their fidelity of implementation. While these findings may first appear to be counterintuitive, some important aspects of this study should be pointed out. First, in this study, researchers measured the procedural fidelity of implementation which only examines whether teachers conducted their instruction by following the written steps in the lesson plan and in the curriculum. The items listed on the procedural checklist for this study were: calling children's attention during lesson, preparing materials before the lesson, using all materials as indicated on the lesson, and providing the lesson without major disruptions or distractions. They were not associated with indicators that are specifically linked to the quality of teachers' language and literacy instruction such as providing open-ended questions, and expanding and repeating children's responses. Moreover, this study provided just two-day workshops to increase teachers' quality of language and literacy instruction. To find the correlation between fidelity of implementation and teachers' quality of literacy instruction, the measurement of fidelity should include both teachers' procedural and conceptual skills in implementing instructional practices.

Measuring the quality of instruction is not a simple process because each teacher uses different instructional strategies and provides the instruction according to children's level of understanding and abilities. To determine how well and often teachers provide literacy instruction to increase children's literacy skills, the extent of teachers' use of instructional strategies during literacy instruction and the level of children's engagement in literacy activities should be measured as well. One way to measure the level of teachers' instructional practices and the amount of time children spent on literacy activities is to observe teachers' instruction and children's engagement by conducting Ecobehavioral assessment (EBA) in classroom settings.

Advantages of using EBA to Measure Children's Engagement

As a measurement of children's academic engagement in school settings, EBA has been used to observe and analyze children's specific academic behaviors. Carta and Greenwood (1985) initially conducted EBA in preschool settings to assess the interaction between student/teacher behavior and the environment by examining ecological and behavior variables that provide learning opportunities to promote learning outcomes. The major assumption in EBA is that children's growth in specific domains is influenced by environment-behavioral interactions. These "ecobehavioral interactions" can be measured in terms of a child's level of engagement in response to the broad array of classroom ecological variables such as, activity settings, and materials as well as teacher behaviors that set the occasion for a child's engagement throughout the classroom day (Carta, Greenwood, & Robinson, 1987; Carta, Sainato, & Greenwood, 1998; Greenwood, Carta, Atwater, 1991; Greenwood et al., 1994). This assumption is very different from the traditional method of measuring engagement that focuses only on child performance without considering environmental variables. Thus, the use of EBA helps to determine the ecological and behavioral variables that may enhance children's academic engagement and learning outcomes.

EBA has often been conducted in elementary school settings to observe children's academic engagement and to examine how interventions increased children's learning outcomes through the identification of contextual variables that are relevant to intervention (Arreaga-Mayer, 1998; Greenwood et al., 1989; Greenwood, Terry, Arreaga-Mayer, & Finney, 1992). The EBA allows researchers to analyze the data collected with computer-based system, called the ecobehavioral assessment system software (EBASS). The system provides information about specific variables of student and teacher behaviors, and identifies when and where a target child

shows high levels of engagement with peers, teachers, or other environmental variables. For example, researchers successfully used the EBA to identify the effect of the Classwide Peer Tutoring Program on increasing academic achievement of children who were at-risk for reading in elementary school settings (Arreaga-Mayer, 1998; Greenwood et al., 1989; Greenwood et al., 1992; Kohler & Greenwood, 1990). In those studies, EBA was used to describe the ecological and teacher variables that promote children's engagement in reading during interventions.

EBA was also used to identify whether an intervention increases teachers' instructional practices and children's engagement on academic activities or tasks. Studies in elementary school settings have demonstrated that EBA is an effective measurement tool for researchers who investigate the structural and sequential features of instruction influencing children's academic responses (Arreaga-Mayer, 1998; Greenwood, et al., 1994; Greenwood, et al., 1991; Greenwood. et al., 1989; Greenwood et al., 1992). Greenwood and his colleagues (1991) reported that EBA has been effectively used in the area of behavior acquisition to assess situational aspects of desired behaviors that relate to engagement in academic responding. They described the importance of using EBA to identify the types of instruction that accelerates academic engagement and that increase children's academic achievement.

More importantly, the use of direct observation in EBA allows the observer to systematically collect information on an individual student who interacts with peers, adults, or materials in classroom settings. Based on these observations, EBA records students' academic behaviors and grouping these behaviors for analysis as well as for recording teachers' instructional behavior and the overall classroom ecology (Greenwood, Tapia, Abbott, & Walton, 2003; Greenwood, 1996). By recording the interval of occurrences for each behavior, EBA data graphs can easily be created to indicate the interplay between teacher and child behaviors.

EBA also allows researchers to measure students' learning time and academic engaged time. By determining students' time engaged in academic activity, EBA can identify variables that are associated with high versus low levels of student engagement. Gettinger and Ball (2007) stated that a strong predictor of academic achievement is the amount of time that students are actively engaged in learning, and reported that the EBA is a useful system to measure children's academic engaged time in the elementary setting. To identify how classroom variables affect the level of student engagement, researchers conducted systematic observations across multiple activities, instructional arrangements, and teacher behaviors to gain an understanding of variables that are associated with high engagement (Greenwood, et al., 1991). Those systematic observations provide data about children's academic engaged time and their level of academic engagement during the time. Thus, EBA is a systematic tool to measure children's academic engaged time and their level of engagement during instructional time in classroom settings.

Measuring Preschoolers' Literacy Engagement by using EBA

Although there is a lack of studies using EBA to measure preschoolers' engagement in academic activities, a few studies have attempted to examine the academic engaged time during instruction in preschool settings. Missall, Tanabe, & McConnell (2007) observed the ecobehavioral contexts that provided opportunities for early literacy-related behaviors in inclusive preschool classrooms using the Ecobehavioral System for Complex Assessment of Preschool Environments (ESCAPE: Carta, Greenwood, & Atwater, 1985). ESCAPE was the first and most widely used ecobehavioral measure for preschool children. It is a computer-based time-sampling assessment that measures the occurrence of observed intervals in each variable by describing the range of ecological characteristics and the co-relationships between teacher and child variables within the environments. Both young children with speech/language delays and

children without disabilities were observed in the preschool settings using the ESCAPE system. Results of this study showed that both groups of children had similar level of academic engagement during teacher-directed instructions and both groups of children spent at least one-third of observed time in early literacy-related activities. Children with language delays were more likely to engage in active learning behaviors than their peers without disabilities, but all children showed passive (i.e., not active) academic engagement with limited interaction and low language production. Though the results of the study did not demonstrate the effect of teacher-directed instruction on enhancing the early literacy activities for children with speech and language delays, the study did suggest that ESCAPE could be useful in identifying the level of children's academic engagement in the preschool classroom.

Recently, Greenwood and his colleagues (2012) observed the quality of classroom instruction and preschoolers' engagement in literacy instruction across four different preschool settings in a total of 265 children: Pre-K, Head Start, Title 1 and Privation tuition. They used Classroom Code for Interactive Recording of Children's Learning Environment (Classroom CIRCLE: Atwater, Montagna, Reynolds, & Tapia, 2009) as an EBA tool to observe teachers' level of literacy focus of instruction across preschool classrooms. The results of this observational study indicated that the mean percentage of intervals in the literacy focus of instruction was varied from 12% to the 24% across four types of preschools. Teachers in Head Start spent the smallest amount of time (about 6%) in the literacy focus of instruction during observation. This study noted that, in general, preschool teachers provided very limited amounts of time in activities focused language and early literacy.

Kontos and her colleagues (2002) conducted an ecobehavioral study to describe the ecological factors that might influence children's complex interactions with objects, peers and

teachers. The focus of the study was to identify specific ecological characteristics that promote preschoolers' development in the classroom setting. She found that, overall, girls were more likely to engage in complex interactions with peers when there was no teacher involvement. Also, the results indicated that the relationship between teacher involvement and complex interactions with objects depended on the specific types of children's activity. The authors suggested that more research was needed to examine the child and classroom characteristics that promote children's complex interactions with objects and peers. This study suggested the need for including narrow and specific contextual variables that can successfully predict child outcomes. Because the EBA system includes variables that can describe classroom activities that cover most of routines that occur in a typical classroom day, it can provide substantial data about the relative amounts of time that a target child spends in academic activities versus non-academic activities. However, EBA system has been rarely used to determine the level of preschool children's engagement in academic activities, especially in the areas of language and early literacy.

Powell et. al (2008) recently conducted an ecobehavioral analysis in preschool classrooms to identify specific group settings and teacher behaviors that accompany children's active engagement across daily routines. The study used EBA to record specific child behavior, type of activity, group setting, and teacher behaviors. The most common teacher behavior was providing direction regardless of the setting. The researchers also found that children showed active engagement in academic activities when teachers monitored children's behaviors or provided affirmations (e.g. praise or social talk). Although the study provided important findings about the relationship between teachers' behaviors and children's active engagement, the categories in the teachers' variables were not specific enough to identify the quality of teachers'

instructions that promoted children's active engagement in the literacy activities. Therefore, to describe the relationship between teachers' literacy instruction and preschoolers' literacy engagement, an EBA observation should examine those teacher and child variables of literacy-related instruction and the amount of children's engagement in literacy activities.

To this point, EBA has not been used to describe whether teachers who have had extensive early literacy PD are influenced in their literacy instruction training. Thus, this study will begin an exploration of the effects of PD by describing the levels of literacy instruction among preschool teachers who have different levels of fidelity in implementing instructional practices in preschool settings. This study will use EBA to describe the differences in child and teacher behaviors in classrooms with high and low fidelity of implementation and then to see if these differences were more pronounced in specific activities or within instruction during specific topical areas. Data from these analyses will be used in future studies to tailor the intervention to promote higher levels of teacher focus and children's literacy engagement.

METHOD

Participants

The participants of this study were selected from teachers and children who were in the Wyandotte-Early Reading First (Wy-ERF) project.

Teachers. Two classrooms were selected for the study from a total of nine Wy-ERF classrooms. Each of the two selected classrooms had three teachers working together (N= 6 total). Classrooms were selected based on classroom fidelity of implementation of Early Reading First literacy practices. In order to contrast classrooms that were maximally different in their quality of implementation of ERF practices, two classrooms were selected using a fidelity checklist that measured how well teachers implemented language and literacy instructional strategies that were a focus of the professional development of the ERF project. The procedure of measuring teachers' fidelity is described in the measurement section and fidelity checklist for small group and center time is attached on the appendix A. Fidelity scores for each classroom were calculated by averaging all three teachers' scores obtained from four different activities (e.g. center time, small group, circle time, and story time). To select the classrooms for this study, fidelity data were used based of fidelity of implementation checklists conducted at the beginning of the school year. Based on the classroom score of the fall fidelity observation, classroom 1 was chosen because the average scores of three teachers' fidelity implementation were the highest (89%) among nine Wy-ERF classrooms. In contrast, classroom 2 was selected because as a team, the three teachers in this classroom received the lowest fidelity (66%). Teachers in these two classrooms differed in their ethnicity, educational background, and teaching experiences (see Table 1).

Children. Three children from each of the two classrooms were selected for the study. In each classroom, one child was selected from the group whose early literacy scores were above benchmark and two children were chosen from those who received early literacy standard scores below benchmark. Characteristics of the six child participants appear in Table 2. These children were selected based on their performance on the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) administered in the early part of the school year. The TOPEL manual established children who received standard scores 90 or below as below average. Followed the TOPEL manual, children in the ERF program were identified as below benchmark when they received TOPEL scores below average on one or more sub-test areas. All children were from low-income families and all were slated to enter kindergarten in the next school year.

Instructional Context of the Study - Wyandotte Early Reading First (WY-ERF)

The purpose of Wy-ERF program was to provide services and training to increase preschool teachers' intensity of language and literacy instruction and to enhance young children's academic success and readiness for kindergarten. The emphases of the Wy-ERF was: (1) helping teachers arrange the classrooms to provide an adequate level of environmental support for literacy; (2) providing coaching and in-service training for PD in early literacy; (3) increasing the use of screening and progress monitoring in early literacy; and (4) enhancing the teachers' fidelity of implementing early literacy instruction.

The Wy-ERF program was designed to enhance teachers' literacy/oral language instruction through intensive PD to fulfill the goal of integrating scientifically-based reading research and learning strategies into existing preschool classrooms (Abbott, 2011). To meet this goal, three early literacy coaches collaboratively worked with teachers to support their

instructional practices across classroom settings. Each of the classroom coaches was responsible for three classrooms and spent four hours a week in each classroom working with teachers incorporating the curriculum and strategies learned in professional development. Coaches supported teachers in developing and implementing their own lesson plans across classroom routines such as small group, center time, circle time, and story time. Coaches also supported teachers in improving their fidelity of implementation of effective literacy-related instructional strategies presented first in in-service training, and then through individual work on-site.

With the support of literacy coaches and provision of literacy focused in-service trainings, teachers in the ERF project spent approximately two and half hours implementing systematic literacy/language instruction as daily morning routines. Every morning, three teachers in a classroom collaboratively worked to conduct early literacy instruction following the timed schedule: 15 min during circle/ large group, 45 min during small group explicit instruction, 1 hr during learning centers, and 15 min during storybook reading time. Teachers provided literacy instruction for each activity (small group, center time, or circle time) as written on their lesson plan. The lesson plan indicated specific steps for each activity and what teachers need to implement during the beginning, the middle, and the end of the activity (Abbott, et. al, 2011).

Each classroom spent up to 45 minutes a day conducting small group instruction and the instruction was broken up into three small group literacy activities that were 15 minutes each. Children were divided with three different groups by the same ages or literacy abilities and each teacher provided literacy instruction to children in her own group that explicitly taught alphabet knowledge, phonological awareness, and interactive book reading focused on vocabulary and comprehension. During approximately 50 minutes of center time, children were allowed to choose among available learning centers such as block area, dramatic play area, writing center,

manipulative area, and art. Across those centers, teachers were expected to provide literacy instruction by interacting with children and having conversations through asking questions about the weekly theme's vocabulary, the letter of the week, the sound of the letter, and by encouraging children to become involved in writing practices.

Research Design

The research questions of this study required a design that allowed the examination of differences between teaching teams who were high versus low implementers of ERF practices. Specific differences were explored by observing the amount of time teachers with high and low implementation fidelity focused on literacy instruction, engaged in more verbal teaching behaviors, and the amount of time the selected children in HF and LF classes engaged in literacy. Also, explored were differences in the topic of literacy instruction: Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR). To compare those differences between HF and LF classroom teaching teams, single-subject design was used in this study. Because this study did not include a baseline phase, a multi-element design was carried out. The multi-element design is often used to compare the effectiveness of two or more independent variables (Hains & Baer, 1989). This design was used to analyze the differences between HF and LF classroom teaching teams by visually graphing the number of intervals that both groups were observed providing literacy instruction across all 16 observation sessions. Descriptive statistics were also used to analyze the child and teacher variables.

Measures

Classroom Code for Interactive Recording of Children's Learning Environments (Classroom CIRCLE). The Classroom CIRCLE (Version 2.0; Atwater, Lee, Montagna, Reynolds, & Tapia, 2009) measures children's experiences in preschool classroom environments

by observing: (1) the context of children's classroom activities; (2) the behavior of teachers and other adults in the classroom; and (3) children's engagement with people and objects. This measure was developed to examine an individual child's engagement in relation to interactions, events, or environmental variables across classroom routines and not to evaluate classroom environment and teacher/child behaviors separately. This observation system measure allows for recording of eight categories of variables: classroom context, teacher verbal response, recipient of verbal response, focus of instruction, teacher involvement, child communication & social, child's social partner, and child engagement. The selected CIRCLE variables for this study and an example of each code in selected variables are shown on appendix B.

Classroom CIRCLE data are recorded using a Personal Digital Assistant (PDA) for coding children's and teachers' behaviors. Using a momentary time sampling approach, an observer focuses on a target child, and the PDA cycles the observer through specific categories of teacher and child variables to record every 15 seconds. The information about specific categories of variables each variable are recorded for a target child. For each category (e.g. teacher verbal response, recipient of verbal response, and child communication and social behavior),the system is programmed to select only one variable for each category during every 15-second interval to extract mutually exclusive data The observer continues following and recording teacher and child categories of behavior for 40 15-second intervals or 10 minutes. After 10 minutes, the observer focuses on a second child and repeats the same pattern of recording categories of teacher and child behaviors and follows this with a third child. In this study, this pattern of 10 minutes of data collection on three children would be repeated once again for a total of 60 minutes of observation in a day.

Teachers' fidelity of implementation. In the Wy-ERF project, the data for teachers' fidelity of implementation were collected to determine how well teachers' implemented instruction strategies during literacy instruction learned from teachers training and coaching. Measurement of the six teachers' fidelity of implementation was carried out twice per year as a part of collecting teacher data to ascertain how well each teacher provided language and early literacy instruction. At the beginning and end of the school year, each teacher's fidelity implementation of instructional practices was measured to evaluate the quality of the early literacy practices throughout daily activities (Abbott, 2011). The fidelity checklist was created by considering the extent of implementation on language and early literacy skills as listed on lesson plans, use of instructional strategies taught during PD, use of behavioral management strategies during instruction, and time management.

The fidelity checklist was used to record each teacher's early literacy instruction across four instructional settings: small group, large group, center time, and story book reading time. The independent ratings of teachers' fidelity of implementation were collected at the specific measurement point. A total of 43 teacher behaviors were rated on a 0 to 2 scale from the non-implementation of literacy instruction or practice (marked as '0') to the well-implemented language and literacy instruction (marked as '2') following the indication of fidelity checklist. Thus, teachers' scores could range between 0 (the lowest possible fidelity) to 100% fidelity. In the Wy-ERF project, teachers were expected to show an average of fidelity scores over 80% across four instructional settings (Abbott, 2011). For this study, a classroom fidelity score was calculated by averaging three teachers' fidelity scores obtained from the two instructional settings: small group and center time. Classroom fidelity data were used to select one classroom

which had teachers with higher fidelity implementation scores and the other classroom with three teachers who showed lower fidelity implementation scores.

Data Collection Procedures

To obtain data on the percentage of time children were exposed to literacy activities in their classrooms, and the relative frequency of different teacher verbal behaviors and children's level of literacy engagement, classroom observation were carried across 16 days in each classroom. Each CIRCLE observation lasted one hour in length with 30 minutes spent observing small group activities and 30 minutes observing center time each day. Each observation was conducted for each classroom once per week, spending a total of 16 weeks. The observation was conducted every Tuesday for classroom 1 and every Thursday for classroom 2. Two classroom teachers used the same curriculum, implementing their lessons with the same weekly theme. Table 3 displays a matrix of the CIRCLE observations for each classroom.

Small group observation. Small group instruction in WY-ERF classrooms was structured by conducting three different literacy activities during small group time for 15 minutes each. Each teacher implemented small group instruction with five to six children on a specific literacy topic (e.g. AK, PA, or IBR). After the first small group, the children in each group would rotate to another teacher for instruction for 15 minutes on another topic. This was followed by another rotation of children to another teacher and 15 minutes of instruction on the third topic.

To observe teachers' small group instruction in each classroom, the CIRCLE observation was conducted by observing each teacher's small group instruction with each target child. For instance, during a 30 minute observation in a classroom 1, a CIRCLE observer would observe Child 1 who receives a teacher's AK instruction in small group for 10 minutes. Then, the observer would record the same teacher's AK instruction with Child 2 and Child 3 for 10

minutes, separately. Since each target child belonged to a different group and each group rotated from one teacher to another teacher, the observer would observe and record the small group instruction occurring between one teacher and three children in a consecutive way.

Over16 observation sessions, observers recorded all three content areas of small group instruction. They observed AK in small group instruction during sessions 1 to 6, PA instruction during sessions 7 to 12, and IBR instruction during sessions 13 to 16. Three teachers in each classroom rotated the topic of literacy instruction on a weekly basis, so the CIRCLE observation was conducted by observing children working with different teachers by literacy topic in small group instruction.

Center time observation. CIRCLE observations during the center time were conducted by observing each of the three children per class for 10 minutes per observation session, spending 30 minutes to observe three children. Children were free to choose from different center activities and the observer would track the child coding the child's behavior and interactions with peers. CIRCLE observations in this study were conducted while each child was involved in free choice play during center time. Children's behaviors were not coded when they were in transition or in clean-up.

Interobserver reliability. Reliability checks were implemented by a secondary observer who was one of assessors in ERF program and received the training on Classroom CIRCLE. Both primary and secondary observer received the CIRCLE training until a minimum of 85% interobserver agreement over three consecutive observation sessions was reached. For this present study, the primary and the secondary observer met weekly to discuss about the observation procedure and how to record each CIRCLE codes selected for the observation.

Reliability checks of this study were completed on 19% (3 out of 16 sessions for small group and center time) of classroom observations.

Interobserver agreement was calculated on an interval-by-interval basis in which the total number of agreements was divided by adding the total number of agreements to disagreements. Then, the number of intervals was multiplied by 100%. Interobserver agreement for HF teaching team was calculated for 91.7% of observed intervals ranged from 80.3% to 98.6%. For LF teaching team, the mean percentage of interobserver agreement was 89.6% ranged from 81.5% to 96.3%. Within CIRCLE variables, for the literacy focus of instruction, the interobserver agreement was 88.3% for HF teaching team and 86.2% for LF teaching team. The interobserver agreement of The CIRCLE codes in the teacher verbal response was 90.3% for HF teaching team and 91.8% for LF teaching team. For the children's literacy engagement, the interobserver agreement of the codes in engagement was 92.3% for HF teaching team and 90.5% for LF teaching team.

Data Analysis

In this study, differences between HF and LF teaching teams were expected in amounts of time they spent in literacy-focused instruction and in teacher verbal responses as observed using the CIRCLE. The mean percentage of intervals observed in the children's literacy engagement on the CIRCLE was calculated to identify differences in the HF versus LF teaching teams. Graphic displays were used to show differences between HF and LF teaching teams in the mean percentage of teachers' literacy instruction and children's literacy engagement during small group and center time. The CIRCLE observations for classroom 1 and 2 were conducted during the same week, two days apart, so teachers' level of exposure to PD would remain similar.

Research question 1, which was to identify the differences in the amount of literacy-focused instruction between HF and LF teaching teams, was examined by the mean number of intervals that all teachers in each classroom were observed in early literacy instruction by using the CIRCLE codes for literacy focus of instruction. The unit of analysis for this research question was the classroom, which included three teachers in a classroom, so the classroom data were obtained by aggregating all three teachers' data within each classroom. The independent variable for this question was the level of fidelity teachers implemented literacy instruction. Dependent variables for this research question were the mean number of intervals teachers with Literacy Focus of Instruction as measured by the CIRCLE during center time and small group instruction. To measure the number of intervals that teachers spent engaged in literacy instruction, a composite variable was created from the CIRCLE category for the literacy focus of instruction by combining all six codes within that category (i.e., phonological awareness, alphabet concepts, comprehension-story, comprehension-other, vocabulary, and reading). Three sub-questions were addressed to examine the differences in the teachers' literacy instruction between HF and LF teaching teams across center time and small group time.

Research question 2 was examined using the mean number of intervals that all teachers were observed in verbal teaching behaviors across small group and center time. To identify the differences in the amount of using verbal teaching behaviors between HF and LF teaching teams, teachers' verbal teaching behaviors were measured using specific CIRCLE codes (positive feedback, expansion/repetition/extension, open-ended questions, and reading. These codes were combined to measure the number of intervals that teachers spend for the verbal teaching behaviors. Dependent variables for this research question were the mean number of intervals that teachers implemented the combined CIRCLE codes in the teacher verbal response. The

independent variable for this research question was the level of teachers' fidelity implementing literacy instruction. Three sub-questions were addressed to examine the differences in the teacher's verbal teaching behaviors between HF and LF teaching teams across center time and small group time.

For research question 3, the mean number of intervals that selected children in each classroom were observed actively engaged in literacy was examined by using the CIRCLE codes for Academic Engagement. . Children's literacy engagement was measured using specific codes selected from the CIRCLE category of Academic Engagement. The four codes selected in the category for literacy engagement were writing, reading words/letters aloud, academic manipulation, and academic verbal response. These codes were combined together to measure the level of children's literacy engagement. Thus, dependent variables for this third research question were the mean number of intervals teachers implemented the combined CIRCLE code in the category of Academic Engagement related to literacy. The independent variable was the level of teachers' fidelity implementing literacy instruction. Three sub-questions were addressed to examine the differences in the children's literacy engagement in the HF versus LF classroom teaching teams across center time and small group instruction.

RESULTS

1. Overall, how did time spent focused in literacy instruction compare in center time versus small group instruction and did classroom teaching teams divergent in their fidelity of implementation [i.e., high fidelity (HF) versus low fidelity (LF)] provide correspondingly different amounts of literacy instruction?

Results on average indicated that the two classroom teaching teams spent vastly more time exposing students to a literacy focus during small group instruction (*M* = 40.3% for HF teaching team vs. *M* = 35.8% for LF teaching team). During center time, the amount of time with literacy focus was much lower and comparable in both groups (*M* = 9.3% for HF teaching team vs. *M* = 9.6% for LF teaching team) (see Table 4).

1) During center time, did the HF classroom teaching team spend more time in early literacy instruction than did the LF classroom teaching team?

Less than a third of a percentage point difference was shown between HF versus LF teaching team based on the composite mean level in center time (see Table 4). There also were few differences in sub-codes of teacher literacy focus during center time (see Table 5). However, HF team did provide greater emphasis in comprehension-other (*M* = 4.6 % for HF teaching team vs. *M* = 4.2 % for LF teaching team) and vocabulary (see Table 5), while the LF team placed greater emphasis on alphabetic knowledge (*M* = 3.8 % for LF teaching team vs. *M* = 1.9 % for HF teaching team). HF teachers were more likely to be involved in asking different questions to help children understand and to work on advancing vocabulary, while LF teachers were more focused on alphabetic knowledge. Visual inspection of trends over time (see Figure 2, upper panels) indicated that the LF teacher team was a bit more variable than the HF team in its amount of time focused on literacy until session 10, when teacher literacy focus declined and

remained between 3 to 8% (see Figure 1). In contrast, the HF team was more stable over all 16 center time sessions varying at or above the 10% level.

2) During small group instruction, did the HF classroom teaching team spend more time in early literacy instruction than did the LF classroom teaching team?

Over all 16 small group sessions, the HF classroom teaching team produced a mean 4.5% advantage in teacher literacy focus over the LF team (40.3% vs.35.8%, see Table 6). Compared to center time in the 9% range, small group literacy focus accounted for more than one third of the instructional time. Over all small group sessions, the LF classroom teaching team was less stable over time, particularly at session 10 through 16 with drops towards 0, than the HF team in Center time who maintained higher levels in this period particularly (see Figure 2). Thus, the HF teaching team conducted their small group literacy instruction with a more consistent focus on teaching early literacy skills over time than LF teaching team did during small group instruction.

Table 5 shows few differences on specific CIRCLE literacy focus observed for the HF and LF teaching teams during small group time. HF classroom teaching team showed a higher percentage of Comprehension-Other (*M* = 13.9%) than LF (*M* = 6.4%). The LF teaching team placed a much higher emphasis on AK (*M* = 11.5%) during small groups. Thus, both classroom teaching teams focused on increasing children's AK skill more than they did in other skills such as PA, vocabulary, and reading. Teachers in the HF classroom teaching team asked more questions to advance children's understanding than teachers in the LF classroom teaching team during small group instruction. In addition, teachers provided much more structured and direct instruction during small group time than they did during center time.

3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did the HF

classroom teaching team spend more time in early literacy than did the LF classroom teaching team?

HF teaching teams were observed spending greater amount of time with literacy focus in the areas of Alphabet Knowledge (AK) and Phonological Awareness (PA) (see Table 6). In AK, there was a slight difference between groups (M = 42.9 % for HF group vs. M = 39.1% for LF group). In PA, a larger difference existed in the literacy focus between groups (M = 39.5% for HF group vs. 31.5% for LF group). The HF teachers varied within the 35 to 52% range were more stable over sessions than LF teachers that were larger between 22% and 55% per session. Visual inspection indicated no systematic differences and frequent overlaps in literacy focus percentages in both groups in the three different topical areas of small group instruction (see Figure 1).

2. Overall, how did time spent focused engaged in verbal teaching behaviors compare in center time versus small group instruction, and did classroom teaching teams divergent in their fidelity of implementation [i.e., high fidelity (HF) versus low fidelity (LF)], produce correspondingly different patterns of verbal teaching behaviors?

Results indicated that both teaching teams spent vastly more time (5 to 6 times more) using verbal teaching responses during small group instruction (19.6 % for HF teaching team vs. 16.5% for LF teaching team) than they did during center time (3.1% for HF teaching team vs. 3.5% for LF teaching team, see Table 7).

1) During center time, did the HF classroom teaching team spend more time in verbal teaching behaviors than did the LF classroom teaching team?

As noted above, no discernible difference was observed between teaching teams (M = 3.1 % for HF teaching team vs. M = 3.5 % for LF teaching team) in their mean amount of time spent

in Teacher Verbal Response during center time (see Table 7). The composite percentage for Teacher Verbal Response was approximately in the 0 to 6.7% range for both teaching teams. Visual inspection of trends over time (upper panels, Figure 2) indicated no differences in Teacher Verbal Response variability between fidelity groups. Both teaching teams were observed relatively infrequently to be using verbal teaching responses (e.g. providing positive feedback, asking open-ended questions, expanding children's responses, and reading) and were more frequently observed engaged in non-academic responding (e.g. verbal statement of requesting for action, singing, vocalization, and general conversation) during center time (see Table 8). However, during center time, the HF teaching team (*M* = 7.7 %) was much less likely to engage in non-academic response than the LF teaching team (*M* = 12.1 %). Thus, HF teachers were less likely to be engaged in the use of verbal responding behaviors that were not academic than were LF teachers.

2) During small group instruction, did the HF classroom teaching team spend more time in verbal teaching behaviors than did the LF classroom teaching team?

During small group instruction, the HF classroom teaching team was observed spending more time engaged in verbal teaching behaviors than the LF team (*M* = 19.6 % for HF teaching team vs. 16.5 % fo4 LF teaching team, see Table 7). During most of the small group instruction sessions, the HF classroom teaching team showed a rather consistent session-by-session advantage in Teacher Verbal Response compared to the LF team that averaged 3.1% more intervals per session (see Table 7). The range in the LF teaching teams session-to-session variation of intervals in Teacher Verbal Response between 5.0 - 53.3 = 48.3% was twice that the HF team who varied between 6.7 - 31.7 = 25.0% (see Figure 2). Thus, the HF teaching team implemented their literacy instruction with more consistent focus on verbal teaching responses

than LF teaching team did during small group instruction. In addition, both teaching teams spent more than five times (over 16%) as much verbal teaching during small group instruction compared to center time (see Table 7).

In terms of key verbal behaviors, during small group instruction, the HF team (*M* = 19.6 %) was higher in Academic Verbal Responding than the LF teaching team (*M* = 16.5 %, see Table 8). The HF and LF groups did not differ during small group instruction in their amount of time in Non-Academic and No Verbal Responding. HF teaching teams spent slightly more time providing academically related verbal responses (such as using positive feedback, expansion/extension/repetition, open-ended questions, and reading) than did the LF team teachers during small group literacy instruction. Both teams spent similar amounts of time (*M* = 38.9 % for HF group vs. *M* = 38.9 % for LF group) using non-academically related verbal responses (such as using closed questions, vocalization, and general conversation). For both teams, this was more than twice as large as the amount of time they were engaged in Academic Verbal Responding during small group instruction.

3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did the HF classroom teaching team spend more time in using verbal teaching behaviors than did the LF classroom teaching team?

Figure 1 indicated no discernible differences between HF and LF teaching teams and frequent overlaps in the percent of intervals they engaged in Teacher Verbal Responding across the three topical areas of small group instruction. The largest difference (6%) between the HF and LF groups in verbal teaching occurred during Interactive Book Reading (IBR) instruction (see Table 9). For both groups, the mean amount of time they were observed in verbal teaching

behaviors was highest during small groups focused on IBR (*M* = 27.5% for HF group vs. *M* = 21.3% for LF group). Both groups spent the least amount of time during small group instruction focused on PA (*M* = 15.58% for HF group vs. *M* = 11.18% for LF group) (see Table 9).

3. Overall, do children with teachers divergent in the fidelity of implementation, high fidelity (HF) versus low fidelity (LF), exhibit correspondingly different levels of literacy engagement in center and small group instruction?

While children in both groups were observed in equally low levels of engagement (i.e., (*M* = 9.2 % for HF teaching team vs. *M* = 9.3 % for LF teaching team) (see Table 10), these levels were over two times larger during small group instruction (*M* = 22.7% for HF teaching team vs. *M* = 19.2% for LF teaching team) (see Table 11).

1) During center time, did children in the HF classroom spend more time in literacy engagement than did children in the classroom with LF teachers?

Both HF and LF teaching teams showed similar center time results for children's literacy engagement. A remarkable finding was that, during nearly half of the 16 sessions, as many as five out of six children were not involved in any literacy engagement during center time. Visual inspection of trends in children's literacy engagement over time (see Figure 2, lower panels) also indicated that children in both HF and LF classrooms showed variability in their mean percentage of literacy engagement across sessions during center time. The range in the HF teaching teams session-to-session variation of intervals in literacy engagement between 5.0 – 30.7 = 24.3% was similar to the range in the LF teaching team varied between .00 – 25.0 = 25.0% (see Figure 2). No systematic session-by-session differences were observed among children in their engagement (*SD* = 12.3 for HF group vs. *SD* = 14.8 for LF group) for the two groups during center time (*M* = 9 .2% for HF group vs. *M* = *9.3*% for LF group) (see Table 10).

2) During small group instruction, did children in the classroom with HF teachers spend more time in literacy engagement than did children in the classroom with LF teachers?

Over all small group sessions, children in the HF classroom teaching team were observed to spend more an average of 3.5% more time observed in literacy engagement than were the children in the LF classroom (*M* = 22.7% for HF group vs. *M* = 19.2% for LF group) (see Table 11). Across 16 sessions, session variability was nearly equal as indicated by the standard deviations (*SD* = 13.0 for HF group vs. *SD* = 12.10 for LF group). Visual inspection of the trends in children's literacy engagement over sessions (see Figure 1, lower two panels) illustrated this variability in children's mean percentage of literacy engagement during small group instruction with no discernable differences in the two groups' literacy engagement.

3) During the three topical areas of small group instruction [i.e., Alphabet Knowledge (AK), Phonological Awareness (PA), and Interactive Book Reading (IBR)], did children in the classroom with HF teachers spend more time in literacy engagement than did children in the classroom with LF teachers?

Children in HF group showed largest difference (7%) in literacy engagement during IBR small group instruction compared to the children in LF group (see Table 12). Children in HF group also spent more time in literacy engagement (5%) than children in LF group during PA instruction. The mean amount of time children in both classrooms were observed in literacy engagement was highest during AK instruction (*M* = 29% for HF group vs. *M* = 22.4% for LF group). Children in both classrooms were least involved in literacy engagement during IBR small group instruction (*M* = 12.5% for HF group vs. *M* = 15.9% for LF group, see Table 12).

DISCUSSION

The purpose of this study was to examine classroom factors influencing children's literacy engagement during small group and center time using ecobehavioral analysis. The assumptions underlying the research questions were: (1) that the ERF PD would result in teachers devoting more instructional time to early literacy and engaged in verbal teaching behaviors, (2) that teaching teams, differing in their level of fidelity of implementation of ERF practices, would be different in these two critical variables during both small group instruction and center time, and (3) that children's level of engagement would also be sensitive to differences in teaching teams' levels of fidelity of implementation of ERF practices. Across all variables examined, the largest differences between HF and LF classrooms were identified during small group instruction. One set of differences was found in the amount of time teachers were observed in literacy-focused activity with the HF teaching team spending more time in literacy-focused activities and engaged in more verbal teaching behaviors than the LF teaching team. Similarly, during small group instruction, children in HF classrooms exhibited higher levels of engagement. These differences between HF and LF classrooms may indicate that teachers who carried through with the early literacy strategies they learned through the ERF PD spent more time in literacy-focused instruction during small group and their children became more actively engaged in literacy related activities such as writing, looking at books, and manipulating learning materials.

The mean percentage of instructional time in literacy focus during small group instruction reported in this study was considerably higher than that reported for pre-kindergarten classes in a recent study by Greenwood and colleagues (2012). They observed teachers' literacy focus of instruction and children's literacy engagement during 30 minutes of observation for each child

using the Classroom CIRCLE across 65 classrooms that varied by preschool program type. They found that the mean amount of time spent in literacy focus across these classrooms was less than 17% but that classroom averages varied across type of program with percentages of literacy focus in state-funded pre-kindergarten programs averaging about 24% but with mean percentages in Head Start programs being less than 6%. Classrooms in the Greenwood study had not participated in ERF program, and literacy-focused PD and coaching were not provided.

These same teacher behavior and child behavior differences between HF and LF classrooms were not observed during center time. This suggests that the ERF early literacy workshops and coaching were more likely to influence small group instruction which was more structured and teacher-directed than the more child-directed center-based activities. In spite of the fact that the PD attempted to increase literacy-focused instruction across activities across the entire day, in general, teaching teams in both HF and LF classrooms spent more time in literacy-focused instruction during small group time than during center time. During small group instruction, both HF and LF teaching teams spent over one-third of their instructional time (40.3 % for HF and 35.8 % for LF) providing instruction focusing on early literacy skills such as AK, PA, and vocabulary. However, during center time both HF and LF teaching teams spent less than 10% of their time focused on literacy instruction.

This small amount of literacy during center time for both groups is worth noting. Though the ERF program emphasized the use of literacy practices across all activities, teachers were much less likely to incorporate literacy during center time. The reason of that might be due to the different structure of small group and center time. Small group instruction is typically more structured and teacher-directed, whereas center time is more child-directed and less structured. Nonetheless, center time can be used to provide children with exposure to literacy concepts even

during child-initiated play and exploration. It appears that teachers may need more assistance in learning and applying strategies for implementing more intentional teaching during center time through activities that are less structured and child-guided.

In the present study, when the various topics of instruction were compared, classroom teaching teams were observed with the highest level of literacy focus when they were teaching AK (42.9 % for HF and 39% for LF) compared to the literacy focus during PA (39.5 % for HF and 31.5 % for LF) and IBR (37.5 % for HF and 37.3 % for LF). The largest difference (8%) was found between HF and LF teaching teams during PA instruction. This indicates that HF teachers spent more amount of time in instructing children about PA skill (e.g. recognizing sound of letter, rhyming, or alliteration) than LF teachers. Justice, et. al. (2008) noted that the features of high quality literacy instruction are to provide direct and explicit instruction about the code-based characteristics of written language. The literacy instruction during AK is relatively teacher-directed and it is more likely to occur while teaching children letters or words. Thus, the highest mean percentage of the literacy focus of instruction during AK small group indicates that teachers were more likely to provide high quality of literacy instruction by providing explicit and purposeful instruction.

Regarding teachers' verbal teaching behaviors, results of this study showed that both classroom teaching teams provided structured literacy instruction using more verbal teaching behaviors during small group than they did during center time. The HF teachers were observed in greater amounts of verbal teaching behaviors than were LF teachers. Teachers' verbal behaviors, coded using the CIRCLE, included using positive feedback, expanding children's responses, and asking open-ended questions. These verbal behaviors were a specific focus of the ERF workshops and coaching, and HF teachers' greater use of these behaviors compared to LF

teachers' use is another indicator that teachers with higher implementation of ERF practices were carrying through on some of the key components of the ERF PD.

One of the largest mean differences in teacher verbal behavior between HF and LF teaching teams occurred during IBR (27.5 % for HF vs. 21.3 % for LF). However, both groups of teachers were observed to engage in more verbal behavior during IBR (27.5 % for HF and 21.3 % for LF) than in AK (18.3 % for HF and 18.5 % for LF) or PA (15.6 % for HF and 11.2% for LF). IBR has been identified as an evidence-based practice for increasing children's expressive language by asking open-ended questions and extending children's responses to improve their understanding of the story (Whitehurst & Lonigan, 1998). The fact that teachers in both groups engaged in more verbal behavior during IBR is an indication that they were using IBR to actively engage children in conversations about books and enhance children's expressive language in this way. Moreover, the HF teachers spent more time implementing these important practices in a way that was emphasized in the ERF PD.

Results of this study also indicated differences in children's literacy engagement between small group and center time. All children had higher levels of engagement in literacy activities during small group instruction more than during center time. Children in both HF and LF classrooms showed higher literacy engagement in small group instruction focused on AK compared to small group instruction focusing on PA or IBR instruction. This finding indicates that, as teachers' provide more intensive and structured literacy instruction, children are more likely to be more actively engaged. For teachers to enhance children's active literacy engagement during IBR, teachers would need to employ specific strategies known to promote children's active responding during group times such as choral responding or the use of response cards (Heward, 1994). Teachers can also get feedback based on EBA data and be apprised of the

activities during which children are either highly engaged or demonstrating low levels engagement. These data can help teachers identify those areas in which they should modify their instruction to promote children's engagement.

In this study, children in the HF classroom spent more time actively engaged in literacy activities during small group instruction than did children in the LF classroom. This indicates that both teachers and children in HF classroom showed greater levels of literacy focus of instruction and literacy engagement than teachers and children in LF classroom. The finding was similar to one reported by Greenwood et al. (1994) who through an ecobehavioral analysis found that children were more likely to be actively engaged in classrooms with greater amount of intensive literacy instruction. Although Greenwood's study was conducted in elementary school settings, the present study also showed that the use of EBA tool that children's literacy engagement covaried with levels of teachers' literacy instruction.

Limitations

A number of limitations should be noted for this study. First, the study examined the level of teachers' literacy instruction and children's engagement in literacy activities in only a small number of classrooms whose teachers took part in an intensive program of professional development. Thus, findings of this study should only be considered exploratory and cannot be generalized to other classrooms, teachers, or children. Greater generalizability of these findings will take place when this study is replicated in studies with a larger number of participants and a greater number of observation sessions.

A second limitation is that in this study, classroom CIRCLE observations were conducted only during small group and center time. The amount of time spent literacy instruction across other classroom activities was not recorded in this study. Early Reading First (ERF) as well as

other professional development programs recommends that literacy instruction occurs across all activities to enhance children's engagement (Abbott, et. al., 2011; Greenwood, et. al, 2012; Missall et al., 2007).

Third, because this was not an experimental study, causal links between teachers' greater use of literacy instruction and increases in children's engagement and improvements in their literacy outcomes cannot be made. Thus, we cannot derive conclusions that higher fidelity of implementation of the ERF practices resulted in higher levels of children's literacy engagement during instruction and those in turn predicted children's early literacy growth.

Implications

Results from this study demonstrate that classrooms that contrasted in the extent of their implementation of prescribed early literacy practices differed in the extent to which their teaching teams focused on literacy and the amount of time children were actively engaged. Future research is needed using the CIRCLE across an entire day to identify the level of teachers' literacy instruction and children's literacy engagement across all daily activities. By observing teachers' instruction and children's engagement in this way, the CIRCLE can be used to examine how well and how often preschool teachers provide the literacy focus of instruction. CIRCLE data will be useful to provide teachers with feedback about how well their various classroom activities are incorporating literacy instruction and how children's engagement varies across activities as well.

More studies are also needed to use CIRCLE data in comparison of the amount of time that teachers' spent during instruction between different preschool program settings such as Head Start, Pre-K programs, and ERF. Future research is needed to see if the findings regarding the amount of literacy focus and verbal instruction would replicate in settings that were not part of

an intensive PD program like ERF and in different types of preschool programs and settings. Examining preschoolers' engagement in literacy activities during instruction by using the Classroom CIRCLE would also provide a good resource in identifying the relationship between the effects of teachers' literacy instruction on children's outcomes in literacy. As researchers use the Classroom CIRCLE in preschool settings, more experimental studies are needed to use the measure to observe preschoolers' engagement in early literacy activities and teachers' literacy instruction related to AK, PA, and vocabulary. Especially, in experimental studies that determine the effectiveness of literacy focused intervention on children's literacy outcomes, conducting CIRCLE observation will provide strong evidence of the levels of fidelity of implementing literacy instruction and children's engagement in activities. These experimental studies should include monitoring children's growth on early literacy as well as their gains on standardized early literacy measures compared their test scores from the beginning to the end of a school year.

Most of all, because few studies conducted CIRCLE for preschoolers without disabilities, researchers need to investigate the efficient use of the measure with a strong design and delivery to demonstrate children's improvement in the literacy engagement and teachers' instruction, and the growth of their early literacy outcomes as resulting from the intervention. More studies are needed to examine the effective use of CIRCLE in improving teachers' fidelity of implementing literacy instruction through PD and coaching. The CIRCLE data that indicate the different level of literacy instruction according to teachers' fidelity implementation will provide useful information to identify the types of training and services that teachers need to increase their level of literacy instruction.

CIRCLE would also be a useful resource in studies of the Response to Intervention (RTI) approach, which focuses on providing differentiated instruction for children who are delayed or

at risk of language and early literacy. The RTI approach often divides children into three tiers depending on their levels of supports in early literacy and language in preschool settings. Future studies should include CIRCLE in each tier to identify the levels of children's engagement in literacy activities and teachers' literacy instruction. In the approach, Classroom CIRCLE data will provide useful information for teachers to compare the level of literacy engagement between children who are at-risk for early literacy and their peers. Thus, overall, Classroom CIRCLE is a strong measure for describing the levels of children's literacy engagement during teachers' instruction in preschool settings.

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Table 1.

Teacher Characteristics

Class	Teachers	Fidelity Level	Fidelity Scores	Ethnicity	Years of Teaching	Degrees Earned
1	1	High	90%	White	10	B.A.
	2	High	93%	Hispanic	4	B.A.
	3	High	85%	Hispanic	3	A.A.
2	4	Low	75%	White	7	B.A.
	5	Low	68%	Hispanic	5	B.A.
	6	Low	56%	Native-American	9	A.A.

Note. Teachers who received their fidelity scores below 80% were considered teachers with low fidelity of implementation. Mean percentage of fidelity for each teacher was calculated by averaging scores on four fidelity checklists: circle time, center time, small group, and story time.

Table 2.

Child Characteristics

Class	Children	Level of early literacy Skills	Ages in months	Ethnicity	Gender
	1	Below Benchmark	54	AA	Boy
1	2	Below Benchmark	55	AA	Girl
	3	Above Benchmark	57	AA	Boy
	4	Above Benchmark	58	AA	Girl
2	5	Below Benchmark	56	AA	Boy
	6	Below Benchmark	54	AA	Boy

Note. Above benchmark is marked when a child's total score on the Test of Preschool Early Literacy (TOPEL) was within or above the typical range (> = 90). Below benchmark is marked when a child's TOPEL scores (tested at the beginning of the semester) are shown below the typical range (<=90) on one or more areas of the sub-tests. Age in months reflects the child's age in the beginning of the fall semester. AA refers the African American.

Table 3.

A Matrix of CIRCLE Observations by Settings, Topic of Delivered Instruction, and Observation Sessions

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Topic of Delivered Instruction for Small Group															
Settings	Class	Student	Alphabet Knowledge (AK)							Phonological Awareness (PA)					Interactive Book Reading (IBR)			
Small Group	1_{HF}	A_b	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
		B_b	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
		C_a	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
	2_{LF}	D_a	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
		E_b	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
		F_b	AK1	AK2	AK3*	AK4	AK5	AK6	PA1	PA2**	PA3	PA4	PA5	PA6	IBR1	IBR2***	IBR3	IBR4
Center Time	1_{HF}	A_b	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16
		B_b	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16
		C_a	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16
	2_{LF}	D_a	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16
		E_b	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16
		F_b	CT1	CT2	CT3*	CT4	CT5	CT6	CT7	CT8**	CT8	CT10	CT11	CT12	CT13	CT14***	CT15	CT16

Note. Class 1_{HF} =Teachers with high fidelity of implementation; Class 2_{LF} = Teachers with low fidelity of implementation; Student A_b, B_b, E_b, F_b = A child with standardized test scores below benchmark; Student C_a, D_a = A child with standardized test scores above benchmark; AK3* = Interobserver reliability for AK small group; PA2** = Interobserver reliability for PA small group; IBR2*** = Interobserver reliability for IBR small group; CT3* = First interobserver reliability for center time; CT8** = Second interobserver reliability for center time; CT14*** = Third interobserver reliability for center time. Each session was lasted for 20 mins per child over 12 weeks of study.

Table 4.

Mean Percentage of Observed Intervals for Literacy Focus of Instruction during Center Time and Small Group Instruction

Session	Center Time				Small Group			
	HF		LF		HF		LF	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	18.42	18.83	23.86	8.35	45.00	10.00	42.28	11.05
2	6.67	7.64	11.67	16.07	34.33	12.58	50.79	3.88
3	10.00	10.00	16.67	12.58	52.28	24.06	38.33	14.43
4	11.75	7.52	10.00	5.00	41.67	12.58	26.63	26.33
5	3.33	5.77	16.67	11.55	38.33	14.43	55.00	10.00
6	13.33	15.27	6.67	7.64	46.67	20.21	20.00	13.23
7	5.18	5.26	8.33	10.41	40.44	12.48	32.63	10.15
8	5.00	5.00	11.67	5.77	38.33	10.41	36.67	7.64
9	1.67	2.89	25.00	39.05	33.33	7.64	39.67	10.00
10	16.67	17.56	5.00	8.66	36.67	14.43	31.67	5.77
11	10.00	13.23	5.00	5.00	43.33	14.43	23.95	13.45
12	5.00	0.00	3.33	2.89	45.00	20.00	24.04	7.37
13	6.67	2.89	3.33	5.77	36.67	23.63	25.44	10.03
14	5.00	5.00	5.00	5.00	41.67	10.41	51.67	5.77
15	13.33	12.58	1.67	2.89	36.67	20.82	28.60	12.17
16	16.84	11.40	0.00	0.00	35.00	10.00	43.33	10.41
Total	9.30	9.94	9.62	12.76	40.27	13.95	35.75	14.38

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage of teachers' literacy focus of instruction. *SD* refers standard deviation.

Table 5.

Mean Percentage of Observed Intervals for CIRCLE codes of Literacy Focus Instruction during Center time and Small Group Instruction

Session	Center Time				Small Group			
	HF		LF		HF		LF	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PA	.32	1.26	.31	1.22	5.22	9.13	4.65	8.29
AK	1.89	3.38	3.76	10.14	8.97	11.30	11.49	12.56
Comp-Story	.63	2.45	.62	3.03	3.96	7.85	4.96	10.95
Comp-Other	4.59	7.06	4.18	6.23	13.97	13.36	6.42	6.61
Voca	1.25	2.63	.64	2.27	5.96	8.65	6.22	7.37
Reading	.62	2.22	.10	.72	2.19	5.54	2.01	4.42
None	90.70	9.94	90.28	12.70	59.73	13.95	64.25	14.38

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage for CIRCLE codes of teachers' literacy focus of instruction. *SD* refers standard deviation. PA means Phonological Awareness. AK means Alphabet Knowledge. Comp-Story means Comprehension-Story and Comp-other refers Comprehension-Other. Voca refers Vocabulary.

Table 6.

Mean Percentage of Observed Intervals for Literacy Focus of Instruction by Topical Areas during Small Group Instruction

Topical Areas	Small Group			
	HF		LF	
	M	*SD*	*M*	*SD*
AK	42.88	15.12	39.01	17.68
PA	39.52	12.27	31.49	9.99
IBR	37.50	15.00	37.26	14.01

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage of teachers' literacy focus of instruction by topical areas. *SD* refers standard deviation. Mean percentage of observed intervals for the literacy focus of instruction was based on the data of small group instruction for Alphabet Knowledge (1-6 sessions), Phonological Awareness (7-12 sessions), and Interactive Book Reading (13-16 sessions).

Table 7.

Mean Percentage of Observed Intervals for Verbal Teaching Behaviors during Center Time and Small Group Instruction

Session	Center Time				Small Group			
	HF		LF		HF		LF	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	3.42	2.97	1.67	2.89	18.33	7.64	18.33	7.64
2	3.33	5.77	6.75	7.61	14.92	5.00	22.54	8.39
3	5.00	0.00	10	13.23	23.33	7.64	16.67	5.77
4	3.42	2.97	1.75	3.04	23.33	2.89	13.60	3.14
5	0.00	0.00	5.00	0.00	16.67	2.89	26.67	7.64
6	1.67	2.89	0.00	0.00	13.33	10.41	13.33	5.77
7	3.33	2.89	1.67	2.89	16.84	5.47	18.77	8.23
8	3.33	2.89	3.33	2.89	6.67	2.89	8.33	14.43
9	1.67	2.89	6.67	5.77	16.67	2.89	11.67	2.89
10	3.33	2.89	3.33	5.77	10.00	5.00	6.67	2.89
11	1.67	2.89	3.33	5.77	11.67	2.89	5.00	0.00
12	1.67	2.89	3.33	5.77	31.67	7.64	16.67	10.41
13	3.33	2.89	3.33	5.77	28.33	20.21	11.67	7.64
14	5.00	5.00	1.67	2.89	28.33	27.54	10.00	10.00
15	6.67	7.64	3.33	2.89	31.67	17.56	10.26	8.90
16	3.33	2.89	1.67	2.89	21.67	2.89	53.33	22.55
Total	3.14	3.37	3.55	5.05	19.59	11.70	16.47	13.58

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage of teachers' verbal teaching behaviors. *SD* refers standard deviation.

Table 8.

Mean Percentage of Observed Intervals for CIRCLE codes of Teacher Verbal Responses during Center time and Small Group Instruction

Session	Center Time				Small Group			
	HF		LF		HF		LF	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Academic Verbal Response	3.14	3.37	3.55	5.05	19.59	11.70	16.47	13.58
Non-Academic Response	7.68	12.07	12.11	13.60	38.98	15.95	38.91	14.43
None	17.79	2.51	16.81	3.14	8.29	3.03	8.85	3.46

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage for CIRCLE codes of teachers' verbal teaching behaviors. *SD* refers standard deviation. Academic Verbal Response refers the composite code of four variables (positive feedback, expansion/repetition/extension, question-open ended, and reading/reciting. Non-Academic Response refers the composite code of three variables (closed question, vocalization, and general conversation). None indicates none of verbal responses occurred.

Table 9.

Mean Percentage of Observed Intervals for Verbal Teaching Behaviors by Topical Areas during Small Group Instruction

Topical Areas	Small Group			
	HF		LF	
	M	*SD*	*M*	*SD*
AK	18.32	6.87	18.52	7.43
PA	15.58	9.20	11.18	8.63
IBR	27.50	16.85	21.32	22.55

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage of teachers' verbal teaching behaviors by topical areas. *SD* refers standard deviation. Mean percentage of observed intervals for verbal teaching behaviors by Topical Areas was based on the data of small group instruction for Alphabet Knowledge (1-6 sessions), Phonological Awareness (7-12 sessions), and Interactive Book Reading (13-16 sessions).

Table 10.

Mean Percentage of Observed Intervals for Children's Literacy Engagement during Center Time

Session	HF					LF				
	C1	C2	C3	*M*	*SD*	C4	C5	C 6	*M*	*SD*
1	10.00	.00	5.00	5.00	5.00	50.00	.00	25.00	25.00	25.00
2	.00	5.00	5.26	3.42	2.97	0.00	5.26	.00	1.75	3.04
3	25.00	.00	10.00	11.67	12.58	50.00	.00	.00	16.67	28.87
4	.00	.00	5.00	1.67	2.89	.00	.00	15.79	5.26	9.12
5	.00	47.37	.00	15.79	27.35	30.00	.00	5.00	11.67	16.07
6	.00	.00	5.00	1.67	2.89	.00	36.84	10.00	15.61	19.05
7	10.53	10.53	.00	7.02	6.08	.00	.00	.00	.00	.00
8	.00	.00	10.00	3.33	5.77	5.00	10.00	5.00	6.67	2.89
9	.00	.00	45.00	15.00	25.98	.00	55.00	.00	18.33	31.75
10	.00	.00	10.00	3.33	5.77	20.00	.00	.00	6.67	11.55
11	15.00	.00	15.00	10.00	8.66	.00	.00	15.00	5.00	8.66
12	42.11	20.00	30.00	30.70	11.07	10.00	.00	.00	3.33	5.77
13	10.00	15.79	5.00	10.26	5.40	.00	.00	10.00	3.33	5.77
14	5.00	30.00	15.00	16.67	12.58	21.05	.00	.00	7.02	12.15
15	.00	10.00	5.00	5.00	5.00	5.00	35.00	20.00	20.00	15.00
16	.00	20.00	.00	6.67	11.55	10.00	.00	.00	3.33	5.77
Total	7.35	9.92	10.33	9.20	12.34	12.57	8.88	6.61	9.35	14.79

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. C refers child. C1, C2, C5, and C6 are children who showed their level of early literacy skills below benchmark. C3 & C4 are children with above benchmark. *M* refers mean percentage of literacy engagement for children in each classroom. *SD* refers standard deviation. Mean percentage of children's literacy engagement was calculated on the composite code of four variables in child engagement: writing, reading words/letter aloud, academic manipulation, and academic verbal response.

Table 11.

Mean Percentage of Observed Intervals for Children's Literacy Engagement during Small Group Instruction

Session	HF					LF				
	C1	C2	C3	*M*	*SD*	C4	C5	C6	*M*	*SD*
1	25.00	35.00	36.84	32.28	6.37	47.37	25.00	36.84	36.40	11.19
2	35.00	5.26	45.00	28.42	20.67	35.00	40.00	5.00	26.67	18.93
3	15.00	20.00	15.00	16.67	2.89	30.00	20.00	20.00	23.33	5.77
4	15.00	30.00	35.00	26.67	10.41	15.79	10.00	15.00	13.60	3.14
5	50.00	35.00	40.00	41.67	7.64	21.05	10.00	35.00	22.02	12.53
6	10.00	45.00	30.00	28.33	17.56	10.53	16.67	10.00	12.40	3.71
7	25.00	15.00	35.00	25.00	10.00	25.00	15.79	5.00	15.26	10.01
8	57.90	25.00	45.00	42.63	16.57	35.00	10.00	10.00	18.33	14.43
9	10.00	10.00	31.58	17.19	12.46	25.00	10.00	20.00	18.33	7.64
10	10.00	20.00	25.00	18.33	7.64	20.00	10.00	5.00	11.67	7.64
11	21.05	25.00	15.00	20.35	5.04	25.00	10.00	5.00	13.33	10.41
12	10.00	15.00	20.00	15.00	5.00	30.00	10.00	55.00	31.67	22.55
13	15.00	5.00	10.53	10.18	5.01	30.00	20.00	10.00	20.00	10.00
14	5.00	10.00	20.00	11.67	7.64	5.26	20.00	11.11	12.12	7.42
15	10.00	10.00	20.00	13.33	5.77	35.00	5.26	5.00	15.09	17.24
16	20.00	15.00	10.00	15.00	5.00	25.00	15.00	10.00	15.83	7.64
Total	20.87	20.02	27.12	22.67	13.04	25.94	15.48	16.12	19.18	12.10

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. C refers child. C1, C2, C5, and C6 are children who showed their level of early literacy skills below benchmark. C3 & C4 are children with above benchmark. *M* refers mean percentage of literacy engagement for children in each classroom. *SD* refers standard deviation. Mean percentage of children's literacy engagement was calculated on the composite code of four variables in child engagement: writing, reading words/letter aloud, academic manipulation, and academic verbal response.

Table 12.

Mean Percentage of Observed Intervals for Children's Literacy Engagement by Topical areas during Small Group Instruction

Topical Areas	HF					LF				
	C1	C2	C3	*M*	*SD*	C4	C 5	C6	*M*	*SD*
AK	25.00	28.38	33.64	29.01	13.04	26.62	20.28	20.31	22.40	12.30
PA	22.33	18.33	28.60	23.08	12.89	26.67	10.96	16.67	18.10	12.95
IBR	12.50	10.00	15.13	12.54	5.42	23.82	15.07	9.03	15.97	10.08

Note. HF refers High Fidelity classroom teaching team. LF refers Low Fidelity classroom teaching team. *M* refers mean percentage of literacy engagement by topical areas for children in each classroom. *SD* refers standard deviation. Mean percentage of observed intervals for children's literacy engagement was based on the data of small group instruction for Alphabet Knowledge (1-6 sessions), Phonological Awareness (7-12 sessions), and Interactive Book Reading (13-16 sessions).

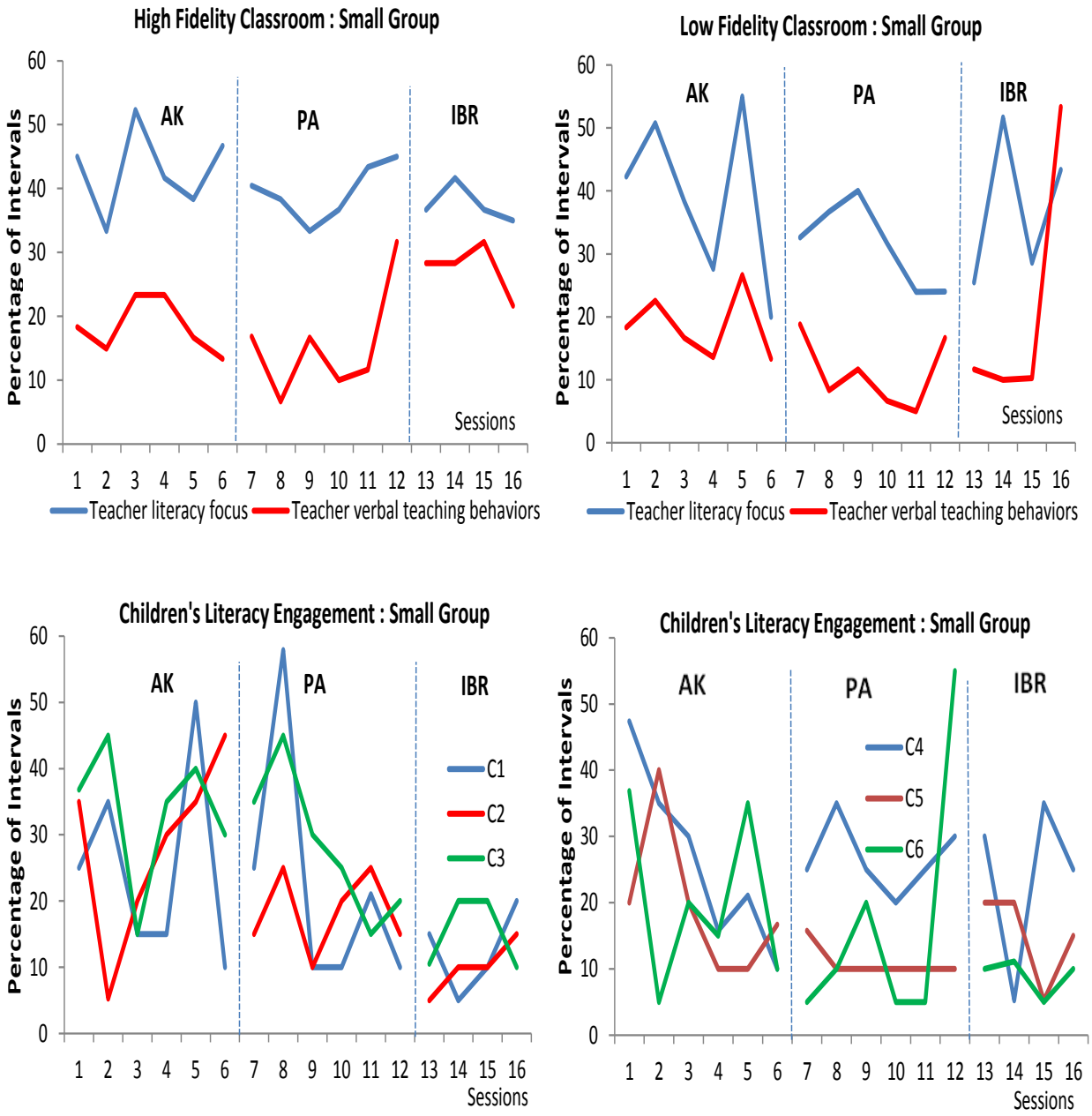

Figure 1. Mean percentage of intervals observed in the teachers' literacy instruction and children's literacy engagement in the HF versus LF classrooms during small group instruction.

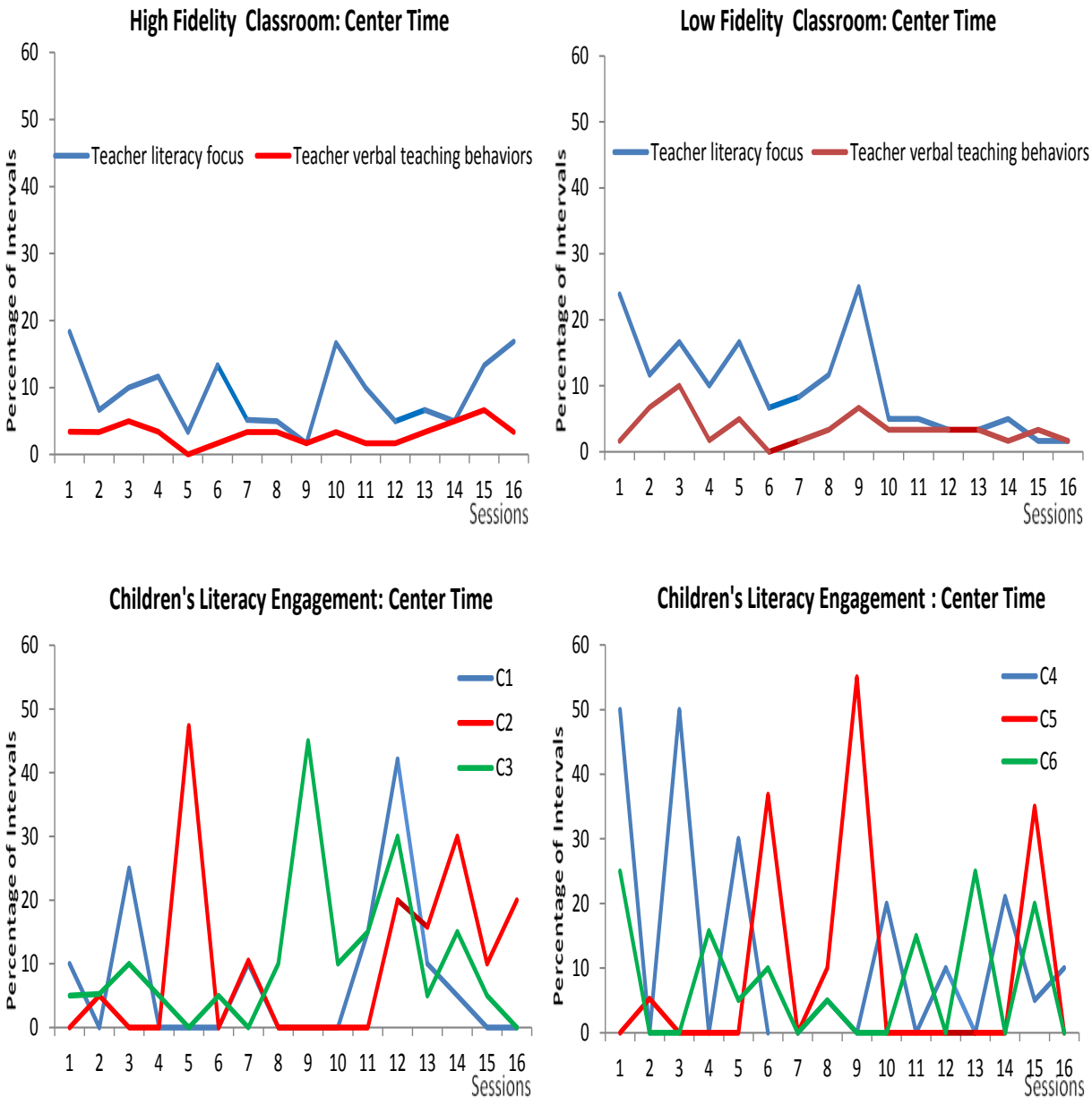

Figure 2. Mean percentage of intervals observed in the teachers' literacy instruction and children's literacy engagement in the HF versus LF classrooms during center time.

Appendix A

Fidelity checklist for small group and center time

Early Reading First Fidelity of Implementation – Small Group

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	It is apparent that the teachers have reviewed the lesson & have supplies ready when lesson begins.				
2.	Lesson plans indicate that the teachers have small group activities planned that include a phonological awareness/letter knowledge, math, and shared reading activity (from the curriculum or teacher planned).				
3.	The teachers introduce the lessons stated on the lesson plan.				
4.	It is apparent that the teachers have differentiated instruction either by having a variety of activities for variable grouping or different forms of the same activity for ability grouping (e.g., use of the ESL bridge)				
5.	During the lesson, the teacher models as needed (I do it).				
6.	The teacher provides guided practice as needed (We do it).				
7.	The teacher provides opportunity for independent student practice (You do it).				
8.	As students or teacher move between small group periods, there is an orderly, short transition (2 minutes or less).				
9.	There is a methodology for keeping track of time during each small group.				
10	Throughout the lesson, the small group teacher provides positive reinforcement & appropriate behavior management techniques.				
11	The transition to or from Small Group Time has a specific song, poem, etc. that is quickly and smoothly executed in less than 2 minutes.				
12	The teachers are able to verbalize the methodology for grouping.				
	Total				
	Student Behavior				
1.	Students listen to the presentation.				
2.	Students have the opportunity for individual practice.				
3.	Students are responsive to the teachers (e.g., quiet down when asked to).				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
Total			
Student Scores			

Required small group time: maximum of ___ minutes per session: Actual small group session time:
Comments:

Early Reading First Fidelity of Implementation – Center Time

Classroom Teachers: _____

Date: _____ School: _____ Classroom: _____ Observer: _____

	Teacher Behavior	A	B	C	D
1.	Teachers have center materials listed in the lesson plan ready.				
2.	A teacher discusses with students prior to center time, the centers that are operational & activities in each center.				
3.	There is a quick, orderly transition activity that takes less than 5 minutes.				
4.	There is a methodology for moving between centers that is reinforced by teachers.				
5.	Literacy & writing related activities are included in every open center.				
6.	Teacher encourages children to participate small group or individualized writing &/or ABC use.				
7.	Throughout center time, teachers provides positive reinforcement & appropriate behavior management techniques.				
8.	Teachers extend the use of oral language (e.g., infusing new vocabulary, extend conversation, encourage theme based exploration).				
9.	Clean-up has a specific transition (song, poem, etc.) that is quickly and smoothly executed within 5 minutes.				
10.	When working with ELLs, teacher uses ELL strategies (e. g., gestures, slower speech, reduced information, provides visual cues).				
	Total				
	Student Behavior				
1.	Students are able to choose center activities				
2.	Students participate in writing activities				
3.	Students are engaged in center activities throughout center time.				
4.	Students actively participate in clean-up.				

0 = Does not do, 1= Does on limited basis, 2 = Fully implements, NA = Not applicable

Teacher Scores	Total possible	Total # received	Fidelity percentage
A			
B			
Total			
Student Scores			

Required center time: minimum of 1 hour: Actual center time _____
Comments:

Appendix B

Selected teacher and child variables from CIRCLE taxonomy

A definition and examples of CIRCLE variables excerpted from CIRCLE manual

Category	Selected Variables
Teacher Verbal Response	Positive Feedback Expansion/Repetition/Extension Question-Open Ended Reading/Reciting
Focus of Instruction	Phonological Awareness Alphabet/Print Concepts Comprehension-Story Comprehension-Other Vocabulary Reading
Literacy Engagement	Writing Reading Words or Letter Aloud Academic Manipulation Academic Verbal Response

Teacher Variables

Verbal Response

Recipient of Teacher Verbal Response

Focus of Instruction

Involvement

Teacher variables describe a Teacher's behavior *toward the Focus Child or a group the Focus Child is part of*. When multiple teachers are present, more than one teacher may be talking to and/or involved with the Child at the same time. In such cases, the observer should remember the *General Priority Rule* to record the behavior that is highest in the list of categories for each variable, even when the highest categories may apply to different teachers.

For example, Teacher A is leading the Focus Child's group in a circle activity, and is sitting at the opposite side of the circle from the Focus Child (more than an arm's length away). Teacher B is sitting beside the Focus Child. At the moment of the beep, Teacher A is asking the entire group what they did over the weekend, and Teacher B is talking to another child (not the Focus Child). The observer would record ***Question – Open-Ended*** under **Verbal Response** (which applies to Teacher A) and ***Close Proximity*** under **Involvement** (which applies to Teacher B). We are capturing the fact that the Child is in close proximity to a Teacher AND is receiving an open-ended question from a Teacher.

Important note about timing

CIRCLE variables are recorded by a *momentary* time sampling method. This means that the observer records the Teacher behavior that is occurring *exactly at the moment of the interval tone*. To do this, the observer must already be focusing on the Teacher when the tone sounds. Coding will not be accurate if the observer hears the tone, and then looks at the Teacher. Thus, as soon as Child variables have been recorded, the observer should look up at the Teacher, focus, and be ready to record the behavior that occurs at the exact moment of the tone. The same strategy should be used during intervals for recording Child behaviors.

Teacher Verbal Response

The **Verbal Response** categories describe Teachers' verbal behavior toward the Child or the Child's group. Nonverbal vocalizations may be included (e.g., "Whee!"). But, except for signs, nonverbal gestures (e.g., pointing, head nodding) are not included in this category.

Specific priority rule for Teacher Talk: If one Teacher is talking to the Child individually and another Teacher is talking to the Child's group, priority is given to comments that are directed to the Child individually.

If the Teacher is in the middle of a sentence at the moment of the tone, the observer should wait until the sentence is completed before deciding on a code. Following the General Decision Rule (p. 7), if a comment fits more than one category, the observer should record the category that appears first in the category list.

Focus of Instruction

This variable is used to identify Teacher behaviors that may help the Child develop early literacy skills. Focus of Instruction may shift within a particular activity. For example, during a ***Small Group*** activity, the teacher may start out by simply reading a story (***Reading***), but then shift to a discussion of words that rhyme on a particular page of the book (***Phonological Awareness***).

In most cases, we are looking for verbal behavior on the part of the Teacher. However, nonverbal prompts can be recorded under **Focus of Instruction** if the Teacher began with verbal prompts and is using nonverbal prompts to encourage the children to continue responding. For example, a Teacher has asked children to name alphabet letters as she points to them one by one. At first, the Teacher began by saying "What is this letter?", "This letter?", but eventually shifted to simply pointing to each letter as she worked through the alphabet. At the moment of the beep, the Teacher is pointing to another letter but is not saying anything. This example would be recorded as ***Alphabet and Print Concepts***.

The Child does not have to be in an academic activity for these categories to be recorded. Teachers may use strategies for promoting early literacy skills within any type of **Classroom Context**. For example, while passing out bananas during lunch, the Teacher may ask the Child to identify the sound "banana" starts with (***Phonological Awareness)*** or may say, "Banana is a fruit. What other kinds of fruit do we have?" (***Comprehension – Other***).

Child Variables

Communication and Social Behavior

Social Partner

Engagement

These variables describe the behavior of the Focus Child.

Important note about timing

As described previously for the Teacher Variables, Child Variables are recorded by a momentary time sampling method. Thus, the observer records child behaviors that are occurring *exactly at the moment of the interval tone.* To do this, the observer must already be focusing on the Child when the tone sounds. As soon as the observer finishes recording Teacher data, he/she should look at the Child, focus, and be ready to record the behavior that occurs at the exact moment of the tone.

Engagement

The **Engagement** variable is used to describe the Child's participation in classroom activities. Most of the **Engagement** categories refer to different forms of *appropriate* engagement – i.e., actions that are relevant to the Focus Child's classroom context and that are consistent with any rules or prompts given by the Teacher. The one clear exception is ***Competing Behavior,*** which is *not appropriate* by definition.

At any point in time, the Child's behavior may fit more than one category of **Engagement**. *In such cases, the observer must remember to record the code that occurs first in the list.*

None of Those Listed should be recorded whenever the Child's behavior does not fit any of the specific **Engagement** categories. Remember that it does not necessarily imply that the Child is not doing anything at all.

Expansion, Repetition, Extension

The Teacher does one of the following:

- Repeats, lengthens, restates, or expands something the Child has just said
- Imitates the Child's words
- Gives words to the Child's non-verbal communication (e.g., saying, "Oh, you want the red one," when the Child points to a crayon)

Examples:

= The Child says, "That dog is big." And the Teacher says, "That's a big dog, isn't it?"

= While pushing a toy car, the Child says, "I'm making it go." And the Adult says, "You're pushing the car. You're making the car go fast."

= The Adult asks, "What color paper do you want to use?" The Child points to a red sheet of paper, and the Adult responds, "You want the red paper."

= The Child points to a toy on the shelf and looks to the Adult for help. The Adult says, "Oh, you want some help, don't you?"

= During story time, the Teacher points to a picture in the book and says, "What kind of animal is this?" The Child says, "Tiger," in unison with other children. The Teacher repeats, "Tiger."

Phonological Awareness

This category is recorded when the Teacher uses strategies that focus on the sound structure of words and phrases, independent of their meaning. This ability to detect and manipulate sounds is termed phonological awareness (Phillips, Clancy-Menchetti & Lonigan, 2008). The most common examples in preschool classrooms are:

- Sentence/word awareness – segmenting a sentence into words
- Syllable awareness – breaking words into syllables
- Rhyme – finding words with the same ending sound
- Alliteration – recognizing words with the same beginning sound
- Phonemic awareness – recognizing the individual sounds, or phonemes, in words

🕯 Instruction focused on the sound a specific letter makes is recorded as ***Alphabet and Print Concepts.***

Examples:

= The Teacher asks the Child's group to type a Child's name into syllables, "Let's clap Julie's name, 'Ju-lie.'" Then, the Teacher claps twice, repeating the syllables with the children.

= During book reading, the Teacher asks the Child's group to break the title into words, "Let's clap the title into words. *Spot Goes to the School*." Then, Teacher claps five times, repeating each word with the children.

= The Teacher asks, "How many words do you hear in the sentence?"

= "What rhymes with bat?"

= The Teacher asks the Child to point to the word that rhymes with bat.

= The Teacher says, "Which picture starts with the same sound as cat?", while emphasizing the /k/ sound.

= The Teacher talks about compound words and asks, "What word does cup (pause) cake make?"

= "Tell me what words you hear in baseball."

= "What is the first sound in barn?"

= The Teacher has shown the Child pictures of a cookie, a car, and a cat and asked the Child to name each one. At the moment of the beep, the Teacher is repeating the name of each picture, while emphasizing the /k/ sound.

= The Teachers says, "Which of these words doesn't sound like the others: tree, bee, cat?"

= While reading a book with text that rhymes, the Teacher points to two different words and says, "Listen, these words sound alike: book, look."

Does NOT include:

≠ "What is this letter?" (***Alphabet/Print Concepts***)

≠ "What letter makes the sound ssss?" (***Alphabet/Print Concepts***)

≠ "What sound does this letter make?" (***Alphabet/Print Concepts***)

Alphabet and Print Concepts

This category is recorded when Teacher uses strategies that focus on the Child's knowledge of letters and their function in print.

- *Concepts of print* – Concepts of print are defined as an awareness of the "form and function of print and the relationship between oral and written language" (Justice & Ezell, 2002, p17). This category includes instruction related to differences between print and picture, recognition of printed text, the organization of print information on a page and within a book, the connection between printed and spoken words, and the process of reading (e.g., moving from left to right, front to back). The Teacher helps the Child to understand that print has meaning and that some parts of a book have a particular meaning, such as the title on the front of the book.
- *Alphabet Knowledge* –Alphabet Knowledge is the ability to identify and name letters of the alphabet, to print letters, and to identify the sounds of letters (McBride-Chang, 1999). Preschool instruction in this category includes strategies such as asking the Child to name letters, asking the child to point to

The majority of preschool children are not ready for spelling, other than a few simple words such as their own name. Given that, we probably will not see teachers spelling words often for children. When they do, we believe it would serve primarily to show children that words are made up of letters, which would fit this category. Thus, we do not have a separate category for spelling.

Examples:

= Before reading a book, the Teacher holds it up for the children to see and points to the title, author, and illustrator while reading them aloud.

= The Teacher says, "This is the author's name; it says Janet Stevens."

= "Show me where the title is."

= "I am going to start reading right here, at the top of the page."

= "This is a word and that is a picture."

= Holding a story book for the children to see, the Teacher reads the words on a page and points to each word as she reads.

= While reading words from a story book, the Teacher points to the beginning of the sentence and then moves her finger in a sweeping motion from left to right.

= "This is the letter A."

= "What letter is this?"

= "What is the letter of this week?"

= "Point to the letter C."

= "What letter makes the /kkk/ sound?"

= Teacher points to the letter F and asks, "What sound does this letter make?"

= "Can you spell your name?"

= The Teacher asks to the Child to find his/her name from several name cards.

= The Teacher asks the child to find the letter 'K' in the classroom.

= During an opening circle activity, the Teacher holds a poster that has a picture and a corresponding word to describe each part of the daily schedule. The Teacher asks the Child what the first thing is on the schedule, while pointing to the appropriate picture and word.

= The Teacher is holding a flash card that has a picture of an apple and the letter A. He draws attention to the fact that apple begins with A.

Does NOT include:

≠ Reading a story without pointing to the words (***Reading***)

≠ The Teacher is holding a flash card that has a picture of an apple and the letter A. He points to the apple and says, "What is this?" ***(Vocabulary)***

Writing

The Child uses a writing instrument (e.g., crayon, marker, chalk, pencil) to pretend to write; to make marks that approximate text, letters, or numbers; or to write conventional letters or numbers. This category includes the *emergent* writing skills that are characteristic of preschoolers and somewhat older children:

- Scribbles with some indication that the child is pretending to write
- Wavy scribbles or other mock writing that is similar to the layout of text
- Approximations of letter or number shapes
- Conventional letters, numbers, or combinations of scribbles and conventional characters
- Combinations of conventional letters with invented spelling
- Combinations of conventional letters with conventional spelling (e.g., Child's

Most preschool children will be at the earlier stages of emergent writing. Thus, it will be important to look carefully for children's attempts to pretend or to approximate writing. To be recorded here, the Child must be using the writing instrument at the moment of the interval tone.

Examples:

= The Child is scribbling with a crayon and says, "I'm writing a letter to Mommy."

= The Child is making letter components (e.g., straight lines, circles loops) with a marker.

= There is a marker board in the kitchen area. At the moment of the tone, the Child is making a mark on the board and talking about things to get at the grocery store.

= The Child is pretending to work in a store and pretending to write the amount of a bill.

= At the bottom of a picture she has drawn, the child writes the first letter of her name followed by a squiggly line.

= At the bottom of his picture, the Child writes makes two shapes that look like approximations of letters in his first name.

= The Child has just said, "I'm writing my sister's name." Then, at the moment of the tone she is writing conventional letters that don't actually spell anything.

= The Child uses a crayon to write his first name on a box.

= The Child writes the number 5 on a paper and says, “I’m that many.”

Does NOT include:

≠ The Child is using a crayon to draw a picture of a house. (***Non-Academic Manipulation***)

≠ The Child is looking at a pretend grocery list she made before the interval tone. (***Non-Academic Attention to Materials***)

Reading Words or Letters Aloud

The Child is doing one of the following:

- Naming printed letters
- Pretending to read something aloud, as when a child holds a book and pretends to read from it
- Reading a word or words aloud – The child may simply recognize the word by sight, such *Stop* on a stop sign. It does not necessarily mean that the child knows how to decode printed material.
- Reading numbers that are part of printed test
- Trying to read a word or words, even if the Child makes a mistake

This category is meant to reflect a Child's developing knowledge that there is a relationship between written and spoken words. Thus it does not require that a Child actually know how to read words accurately.

Examples:

= The Child is naming letters that are printed on flash cards.

= The Child is holding a book and pretending to read it to a peer.

= The Child is saying the title of a book while the Teacher points to each separate word.

= The Child finds her name on a list and says it aloud.

= The Child says, "One fish, two fish, red fish, blue fish," while looking at the appropriate pages in a Doctor Seuss book. The observer does not know whether the Child knows how to read the words or has memorized them.

= The Teacher points to the word *cat* on a poster and say, "Who can tell me what this word is?" The Child says, "Dog?"