RESEARCH ARTICLE

From Research to Evidence-Based Practice: An Account of the Scientific Implementation of Dialogic Buddy Reading

Mary Jane McIlwain

Auburn University

M. Susan Burns and C. Stephen White

George Mason University

The research to practice rift is apparent as evidence-based practices remain outside the "real world" of schools. In this study we create and implement a program capitalizing on the research in dialogic reading (DR), a shared reading protocol used by adults with young children. The study employed a single subject design to examine the implementation of a modified version of DR in a Head Start classroom, whereby sixth-grade student use the DR protocol as they read with the pre-school students. Fidelity to the major components of DR was considered in the design, training, and implementation phases of the adapted protocol in this authentic context. Visual analysis of observation data is discussed using systems theory; indicating DBR can be implemented with varying levels of fidelity. Therefore, evidence-based practices can transfer to the "real world" of schools provided that rigorous implementation and constructive use of fidelity measures are present within a well-defined, responsive system leading to continuous enhancement.

Keywords: reading; shared reading; read aloud

As we consider evidence-based practices and how they transfer to the "real world" of schools, we strive to address practical and available resources in the school combined with rigor and fidelity to evidence-based practice. In our case we create and implement a program capitalizing on the research in dialogic reading, a shared reading protocol used by parents, teachers, and caregivers with young children. More specifically, this article shares how schools can transform dialogic reading (DR) to dialogic buddy reading (DBR), whereby upper elementary students use the DR protocol with a school's youngest students. This article is meant to appeal to a particular group of stakeholders—those researchers, teachers and specialists interested in using and contributing to empirically sound literacy learning research in diverse, early childhood and elementary classrooms. Though fidelity has come to be regarded as a tool to evaluate teachers' ability or willingness to adhere to evidence-based practices or research-based commercial programs, the authors of this article conceptualize fidelity as a tool to be embraced by

researchers, teachers and other education professionals as a way to implement evidence-based practice with increasing fidelity, in the "real world" of schools.

Research focused on fidelity to emergent literacy activities like DR is important to determine ways of impacting the inequalities that exist as students enter school (Lee & Burkam, 2002). DR has a rich and varied research base supporting its inclusion in early childhood and elementary routines focused on increasing various aspects of oral language development. Applied research investigating ways to increase fidelity of DR in children's lives across varied educational contexts will build on students' existing social and linguistic tools; and allowing these students to access such tools will leverage early success in reading and writing. This emerging line of research is very exciting as it connects classroom and scholarship in a way that builds literacy and equity for many students often marginalized.

The purpose of this study is to initiate the exploration of using sixth grade students to conduct daily dialogic reading with Head Start students in order to bring the benefits of DR to more children typically found at the lower end of the achievement gap. The construct of fidelity to implementation offers insights into two elemental areas: defining the varying levels of adherence to the components of dialogic reading achieved by the pairs of students throughout the study and determining leverage points to enhance fidelity to implementation by sixth grade students as students continue to work together. Systems theory (Senge, 1994) provides a framework to relate the levels of fidelity attained to what fidelity might look like in the future, provided the leverage points are addressed. The design of the study is informed by a review of the literature synthesizing research from three relevant areas: dialogic reading, fidelity as it relates to implementation science, and peer tutoring. However, first a definition of dialogic reading is provided to orient readers to the routine's protocol.

Dialogic reading (Whitehurst et al., 1988) is a structured way of interacting with very young children while reading storybooks. Dialogic reading (DR) has repeatedly improved the vocabulary and verbal expression of children when used at home and at daycare centers (Mol, Bus, de Jong, & Smeets, 2008). The structure, or protocol, for the adult child interaction is initiated during the rereading of previously shared stories, and it invites the child to participate in the telling of the story. The protocol includes four steps. First, the parent or teacher prompts the child. The prompt can ask for a word (as in a cloze procedure), the recall of an action, an inference based on open-ended questions, or a personal connection. The prompt is followed by an adult evaluation of the child's response through praise and correction. The evaluation is quickly followed with an extension of the child's initial response. Finally the cycle is completed when the adult asks the child to repeat the extended response to the initial prompt.

Two acronyms aid a reader's recall of the dialogic reading protocol. First, the DR cycle--prompt, evaluate, extend, and repeat—is remembered by PEER (Pearson Early Learning, 2002). Second, the various prompt options—cloze, recall, open ended questions, wh- questions, and distance questions—is captured by the acronym, CROWD (Pearson Early Learning, 2002). Two scaffolds picturing PEER and CROWD can be found in Appendix A. The following excerpt is an example of an interaction scaffolded through the DR protocol while reading the story, *Whistle for Willie*:

> *Peggy [Teacher]:* "So instead he began to turn himself around—around and around he whirled… faster and faster…" What was it like when he whirled? "He whirled…faster and faster…"
> *Ralph [Child]:* He falls.

Ms. Peggy: He falls? Not totally, but almost! So when he "whirled" he went around and around in circles, right?
Ralph: Fast, fast, fast!
Ms. Peggy: Fast, fast, fast. When he whirled he went around and around in circles really fast.
Ralph: Fast, went around in circles fast.
Ms. Peggy: Let's do it! [Ms. Peggy and Ralph go around and around in circles] I'm whirling! I'm whirling! I'm whirling!
Ralph: I'm whirling! I'm whirling! (Burns, Johnson, & Assaf, 2012)

Burns et al. (2012) discuss the value of including DR as a routine in preschool classrooms because of its documented positive effects on children's development of oral language, as shown in the following review of the literature.

DIALOGIC READING

The DR research base of 26 years has allowed replication across the previously mentioned contexts and has employed multiple designs, with each generation of studies considering the limitations shared by the older studies. The United States Department of Education's What Works Clearinghouse (WWC) reviewed four studies of DR and concluded that the activity has potentially positive effects on oral language, print knowledge and early reading and writing (*Dialogic Reading. What Works Clearinghouse Intervention Report*, 2006). These and other studies use a quasi experimental design, including a control group, and statistical analysis of standardized language tests (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Chow & McBride-Chang, 2003; Fielding-Barnsley & Purdie, 2003; Huebner, 2000b; Whitehurst et al., 1988). In addition, many studies coded audio or video taped DR sessions (Blom-Hoffman, O'Neil-Pirozzi, Volpe, Cutting, & Bissinger, 2006; Briesch, Chafouleas, Lebel, & Blom-Hoffman, 2008; Huebner, 2000b; Huebner & Meltzoff, 2005; Jimenez, Filippini, & Gerber, 2006; Whitehurst et al., 1988), and began to include single subject designs (Briesch et al., 2008). As the contexts move from the home to daycare centers and classrooms, some studies also included researcher created vocabulary and linguistic measures (Hargrave & Senechal, 2000; Lonigan & Whitehurst, 1998; Senechal, 1997; Valdez-Menchaca & Whitehurst, 1992; Whitehurst & Arnold, 1994) Common themes running through limitations listed across designs and contexts are:

1. The need to study DR's prolonged influence in low socioeconomic environments (Arnold et al., 1994; Briesch et al., 2008; Huebner, 2000a; Mol et al., 2008; Morrow, 1988; Whitehurst et al., 1994)
2. The need to study DR's influence on English language learners language and how this relates to reading acquisition in the second language (Jimenez et al., 2006)
3. The need to increase fidelity to the protocol and frequency of use (Briesch et al., 2008; Chow & McBride-Chang, 2003; Halsey, 2008; Hargrave & Senechal, 2000; Huebner, 2000b; Lonigan & Whitehurst, 1998)

Each of the three limitations is considered in design of the present study. Fidelity to implementation is of particular importance to this dissemination of the work because the work explores the degree to which sixth grade students can take on the role usually played by parents, teachers or adult cares givers when conducting DR with young children. However, fidelity to implementation merges with implementation science as the project focuses on the use of DR in the context of a real classroom operating within the demands of an existing school program.

FIDELITY AND IMPLEMENTATION SCIENCE

Treatment fidelity, or fidelity of implementation, refers to the degree to which an intervention is implemented according to the critical program components. Researchers in the public health and education fields agree that treatment fidelity is imperative; however, the construct of fidelity broadens to include what occurs before implementation in order to enhance fidelity of implementation across contexts. This broader perspective adds the likelihood of high treatment fidelity and therefore strengthens relations to outcomes and increases internal and external validity (Borrelli et al., 2005; Resnick et al., 2005). Literature in the health sciences and education also describe two different ways of explaining five core components of fidelity. One summary labels the components as design, training, delivery, receipt, and enactment (Borrelli et al., 2005). A second summary divides these five components into two categories: fidelity to structure (adherence, duration, and participant responsiveness) and fidelity to processes (quality of delivery, program differentiation, and participant responsiveness) (O'Donnell, 2008; Ruiz-Primo, 2006). Many researchers agree that a multi method approach to developing measures across all dimensions will positively influence fidelity findings and communication (Borrelli et al., 2005; Ruiz-Primo, 2006; Smith, Daunic, & Taylor, 2007). Doing so generates a more complete picture of what happened before and during implementation and, if related to the outcomes of the intervention, will aid in replication efforts.

Just as researchers determined that the construct of fidelity should be broadened beyond implementation, researchers in curriculum and instruction and special education are finding that what fidelity actually looks like or how it plays out in various classrooms needs to be considered(Cook & Odom, 2013; Harn, Parisi, & Stoolmiller, 2013a; Johnson & McMaster, 2013; Lendrum & Humphrey, 2012). Implementation science offers a way in which to organize, synthesize and disseminate such efforts. Implementation science seeks to define methods that aid in the systematic study how evidence-based practices become routine practices across contexts (Cook & Odom, 2013). The research to practice gap points to the need to determine what level of fidelity is deemed adequate to produce positive outcomes (Lendrum & Humphrey, 2012) and how to facilitate and document adaptations to implementation that optimize a practice's use across diverse contexts while maintaining integrity to the core components that are shown to cause these outcomes (Harn et al., 2013a; Johnson & McMaster, 2013). The difficulty of systematically studying and sharing research on these two points is that each will look different for each practice being studied and then different again for each context in which it is being studied. However, as researchers work with practitioners to address these elements, practice will begin informing scholarship in a way that will facilitate uptakes of evidence-based practices across diverse contexts (Harn et al., 2013a), developing equity from the classroom to scholarship and back.

Harn et al. (2013) note the full construct of fidelity consists of both structure and process dimensions, but also state that literacy outcomes are predicted by process fidelity—quality of delivery, program differentiation, and participant responsiveness. As such, the goal of increasing implementation fidelity of a particular literacy based practice in any given context may benefit by addressing those areas in the effort to make the practice sustainable. This process may constitute a method for balancing fidelity with adaptability, a need articulated by Johnson & McMaster (2013) as they and others studied the effectiveness and practical use of peer tutoring in elementary schools.

PEER TUTORING

The research focused on peer tutoring spans decades, and, the topic continues to be studied and refined due to its potential to raise achievement across academic and social levels. A recent meta-analysis synthesized past research, concurred with other meta-analysis studies, and found that cross age and same age peer tutoring is an effective instructional routine. Leung (2015) extended the research base to define best practices in the design of a peer tutoring program, some of which include: age with secondary and college attaining larger effect sizes than elementary and kindergarten; ability level of the tutor with the effect size being larger for lower ability tutors and high and low ability tutees; structured sessions attained larger effect sizes; and peer tutoring in reading and math produced larger effect sizes than those in other subjects.

Two elementary, same-age, mixed ability, structured, peer tutoring programs in literacy have shown some promise according to a WWC Intervention Report on beginning reading. First, the WWC reviewed twelve studies focused on ClassWide Peer Tutoring (CWPT), with one study meeting the criteria for evidence standards. CWPT involves students in a single classroom being paired (random, mixed ability or same ability) to review and practice previously taught literacy content. The tutoring session is structured within a 30-minute block and, according to WWC, has the potential to facilitate positive effects on general reading ability (What Works Clearinghouse (ED), 2007). Other CWPT research, including studies that reach beyond beginning reading and those studies not meeting the criteria set by WWC, also find positive effects of CWPT on various targeted literacy behaviors and in a variety of contexts (Bowman-Perrott, 2009; Greenwood, 2001; Greenwood & Finney, 1993; Hashimoto, Utley, Greenwood, & Pitchlyn, 2007) However, the studies including fidelity measures show these positive outcomes vary according to levels of fidelity to implementation met (Greenwood, 2001; Greenwood & Finney, 1993; Hashimoto et al., 2007; Maheady, Harper, Mallette, & Karnes, 2004).

WWC reviewed research associated with a second promising early literacy, peer tutoring program, Peer Assisted Learning/Literacy Strategies (PALS)—also a same age, mixed ability, structured program. PALS involves mixed ability pairs that work through a structured 35 minute periods three to four times a week. Specific interactive structures beyond first grade include partner reading, summarizing, and predicting. Structures for kindergarten and first grade include phonemic awareness, phonics, decoding, and sight words in addition to passage reading, retelling and predicting. Forty-five studies were reviewed with respect to effects on alphabetics, fluency and comprehension and three met the evidence criteria, with one meeting with reservations. Based on these studies, PALS shows potentially positive effects in alphabetics (which includes phonemic awareness), no effects in fluency and mixed effects in comprehension (which includes vocabulary by nature of the cloze procedure used in the measurement). Other studies of PALS

show positive effects in a variety of early literacy behaviors (phonological awareness, phonics, fluency and comprehension) spanning kindergarten through second grade and across contexts (Fuchs, Fuchs, Thompson, Otaiba, et al., 2001; Mathes, Grek, Howard, Babyak, & Allen, 1999; Mathes, Howard, Allen, & Fuchs, 1998; Mathes, Torgesen, & Allor, 2001; McMaster, Kung, Han, & Cao, 2008; Saenz, Fuchs, & Fuchs, 2005). Like the studies of CWPT, and not surprisingly so, effectiveness is a function of fidelity to implementation (Fuchs, Fuchs, Thompson, Otaiba, et al., 2001; Fuchs, Fuchs, Thompson, Svenson, et al., 2001; Mathes et al., 1998; Stein, Berends, Fuchs, McMaster, Saenz, et al., 2008)

    As researchers work to take CWPT and PALS to scale, another line of cross age peer tutoring research is emerging. Reading Together (Hattie, 2006) involves more able readers from the upper elementary grades reading with second grade students struggling to get beyond simply decoding text to more strategic and meaningful activity with text. As with CWPT and PALS, Reading Together is structured, takes 30 minutes to implement and is expected to supplement core-reading programs. Unlike CWPT and PALS, participation in Reading Together is limited to those identified as needing intervention, whereas the class-wide programs involve all students. Hattie (2006) conducted evaluations at different implementation cites and concluded that younger students participating in Reading Together make progress fluency and comprehension, as well as show increased motivation. Although specific fidelity measures are not shared, recorded sessions of Reading Together did show variances in how the program was implemented at the teacher and tutor levels (Hattie, 2006).

    The literature in peer tutoring is promising as it studies children's ability to take on fairly complex teaching roles as defined by the critical components and processes in the respective programs. Fidelity of implementation measures included observation checklists focused on teacher facilitation and student implementation (Fuchs, Fuchs, Thompson, Otaiba, et al., 2001; Fuchs, Fuchs, Thompson, Svenson, et al., 2001; Mathes et al., 1999; Stein, Berends, Fuchs, McMaster, Sáenz, et al., 2008). The promise is accentuated because positive outcomes are measured as researchers work the practitioners across diverse contexts to make adaptations to the programs based on the experiences in the field (Greenwood, 2001; Greenwood & Finney, 1993; Johnson & McMaster, 2013; McMaster et al., 2014; McMaster, Insoon Han, Coolong-Chaffin, & Fuchs, 2013).

DIALOGIC BUDDY READING

The present study initiates the next generation of DR studies in the form of DBR, in which 6th grade students were trained to facilitate DBR with Head Start students in a public elementary, pre-kindergarten through sixth grade, school. The following sections detail the exploration of the following questions: What level of fidelity to implementation can be observed and measured when sixth grade students conduct DBR with Head Start students? What are the leverage points for improving fidelity to implementation over time? If sixth grade students could facilitate daily DBR with Head Start students, then the positive effects of DR could reach many more children to provide experiences that help children develop vocabulary, linguistic complexity, and de-contextualized use of language.

METHOD

This study employed a single subject, multiple probe design to study the successful implementation of DBR in a Head Start classroom. The data collection included vocabulary probes linked to positive trends in students' receptive and expressive vocabularies; however, the detailed presentation of these data are available in another report (McIlwain, 2012; McIlwain & Burns, 2014) so will be alluded to but not repeated here. The primary focus of this article is the fidelity to implementation of DBR, indicating how evidence-based practices transfer to the "real world" of schools given rigorous implementation and constructive use of fidelity measures.

The training needs and the young age of Head Start students in the fall led to the following timeline and recruitment and selection procedures. First, all students in Head Start and sixth grade students were recruited by mid September. Random selection with replacement was used to select six pairs for data collection at this point; however, all pairs participated in DBR simultaneously in the preschool classroom. To prepare for DBR, the older students were trained in September and October without their buddies in order to provide the preschool children time to adjust to the routines of school activities. Buddies began working together in November providing time for the pairs to become comfortable with one another and to orient the younger students to sustained storybook reading. Data collection using pre-selected books and pre assessed vocabulary words began in February.

All students, 14 pairs and one trio, participated in DBR simultaneously in the preschool classroom four mornings per week. The younger students waited for their buddy by sitting in a circle on the rug. The younger students always had a book that they selected with them, and as weeks went on, would be pretend reading or sharing with a friend when the older students entered. The buddies would greet each other with smiles, hugs and high fives; then they would go to their favorite spots in the classroom to begin reading. The older student of each pair involved in data collection brought a book box with them which included the specified book or books that needed to be read during vocabulary data collection phases.

The space was energized with a great deal of activity, language and laughter that usually centered on the books being read. There were times of play as students from different pairs became engaged with one another's books or conversations. However, students were consistently focused on DBR. All pairs participated in DBR at the same time in the typical classroom context. Moreover, all fidelity observations were collected in this classroom context as these students engaged in DBR. The following sections provide more detail about the participants, measures, design, and analysis used.

Participants

The study took place in a small, diverse, suburban public elementary school that served Head Start through sixth grade. According to the school system's demographic information, the school membership during the year the study took place included 463 students. Forty-five percent of the population was female and 55% was male. Student demographic characteristics broke down into the following ethnic categories: 0.2% American Indian, 6.7% Asian, 10.7% African American, 26.6% Hispanic, 8.0% Multiracial, 47.7% Caucasian (School website, 2011). Approximately 20% of the student population received English language support. Roughly 28.61% of the school population participated in the free and reduced lunch program.

The participant pool consisted of 17 sixth grade and 15 Head Start students. The students represented a diverse range of socio-economic, linguistic, and cultural backgrounds that mirrored that of the school membership. Ten sixth grade students were female and seven were male. Six Head Start students were female and nine were male.

The ethnic backgrounds of the sixth grade students broke down into the following categories: one Asian student, two African American students, six Hispanic students, two Multi-racial students, and six Caucasian students. The ethnic backgrounds of the Head Start students broke down into the following categories: three Asian students, four African American students, six Hispanic students, and two Multi-racial students. The language background of the sixth grade students broke down into the following categories: 10 students spoke English only, four students spoke Spanish and received English language services at school, two students were bilingual in Spanish and English, one student was bilingual in Urdu and English. The language used in the homes of the Head Start students broke down into the following categories: three students spoke English only; three students spoke predominantly English but had one parent that spoke Spanish; five students spoke Spanish; one student spoke French and English at home; one student spoke Turkish at home; one student spoke Urdu at home; and one spoke Arabic at home. The average age of the sixth grade students in November of 2009 was 11 years and nine months. The average age of the preschool students in November of 2009 was four years and zero months.

The participant pool was organized into 14 pairs and one trio. The dominant language spoken was matched for seven pairs—three pairs spoke English and four pairs spoke Spanish. Five pairs and one trio consisted of females. Six pairs consisted of males. Three pairs consisted of a male and a female.

Selected participants.   Six pairs were randomly selected for data collection. The pairs were identified on individual pieces of paper and placed in one of two containers representing two additional pools, English or Spanish. Four pairs were selected from the English pool and two were selected from the Spanish pool. The selected pairs are described using numbers and pseudonyms.

Pair number one consisted of two females, Ashley (a Caucasian sixth grade student) and Maria (an African American and Hispanic Head Start student). Ashley was 12 years of age, spoke English, and her teacher considered her to be on or above grade level in language arts. Qualitative observational data collected during fidelity checks noted that she exhibited calm and deliberate mannerisms. Maria was four years and 10 months of age and in her second year of Head Start. She had one sibling, her twin sister. She spoke English in the home; however, her mother was learning English and spoke to her in Spanish. Ashley exhibited quiet and obedient mannerisms during DBR sessions. Pair number one used English during DBR.

Pair number two consisted of two females, Lizzie (a Caucasian sixth grade student) and Sashi (an North African Head Start student from Egypt). Lizzie was 12 years and four months of age, and spoke English. Her teacher considered her to be on grade level in reading, but she received special education support for writing. Qualitative observational data collected during fidelity checks noted that Lizzie exhibited animated or expressive mannerisms and often needed to refocus Sashi. Sashi was four years and two months of age and in her first year of Head Start. She had one younger sibling. She spoke Arabic in the home. Sashi exhibited inattentive and playful mannerisms during DBR sessions. Pair number two used English during DBR.

Pair number three consisted of one female and one male, Jenny (an African American and Hispanic sixth grade student) and Jeremy (a Hispanic Head Start student). Jenny was 11

years and two months of age. She was bilingual in English and Spanish, and she did not receive any English language support at school. She was considered by her teacher to be on or above grade level in language arts. Qualitative data collected during fidelity checks noted that Jenny was mild mannered and a little unsure of herself with Jeremy in some instances. Jeremy was four years and nine months of age and in his first year of Head Start. He had three older female siblings, all in elementary school. He spoke Spanish at home. Jeremy exhibited attentive, quiet and comedic mannerisms during DBR sessions. Pair number three used English and Spanish during DBR. Jenny read in English or Spanish and they dialogued predominantly in Spanish.

Pair number four consisted of two males, Ferrel (a Caucasian sixth grade student) and Don (an African American Head Start student). Ferrel was 11 years and five months of age, spoke English, and was considered on grade level in language arts. Qualitative data collected during fidelity checks noted that Ferrel exhibited very deliberate mannerisms and was oriented towards leadership. Don was four years and 11 months of age and in his second year of preschool. He had no siblings. He spoke English and French in the home. Don exhibited attentive and energetic mannerisms during DBR sessions. Pair number four used English during DBR.

Pair number five consisted of two females, Noora (a Hispanic sixth grade student) and Marion (a Hispanic Head Start student). Noora was 13 years and two months of age. She spoke Spanish, received English language support in school, and was considered below grade level in language arts. Qualitative data collected during fidelity checks noted that Noora exhibited focused, but playful mannerisms. Marion was four years and nine months of age and in her first year of Head Start. She had no siblings. She spoke English and Spanish in the home. Marion exhibited attentive and obedient mannerisms during DBR sessions. Pair number five used English and Spanish during DBR, but tended to use more English based on Marion"s preference.

Pair number six consisted of two females, Julia (an African American sixth grade student) and Paige (an African American Head Start student). Julia was 11 years and nine months of age, spoke English, and was considered below grade level in language arts. Qualitative data collected during fidelity checks noted that Julia exhibited animated and focused mannerisms. Paige was five years and one month of age and in her first year of Head Start. She spoke English. She exhibited attentive, deliberate, and inhibited mannerisms during DBR sessions. Pair number six used English during DBR.

Measure

Observations were documented using a fidelity protocol checklist (Appendix B) which noted the type of prompt used (completion prompts, recall prompts, open ended prompts, wh- prompts, distance questions) and the components of DBR used (prompt, evaluate, extend, repeat) during each DBR cycle. A DBR cycle begins with a prompt and ends with a repeat. Therefore, each observation denoted the number of DBR cycles initiated and the degree to which each component of a cycle was used during a seven to 10 minute period.

Procedure

The procedure consists of a training phase and a delivery phase. The two are detailed below. Keep in mind that each of these phases took place between 9:10 and 9:25 four mornings a week.

The times were within particular school periods, but did not disrupt formal instructional time for either age group.

Training phase.   The training for DBR consisted of two stages. The first level involved learning how to select books and target words and how to conduct DBR. The second phase involved the pairs engaging in DBR with ongoing coaching from the researcher. A more detailed description of each phase follows.

The first stage of the training occurred over twenty-eight 15 minute sessions at the onset of the study (September and October), but before the pairs began to meet. The researcher met with the older students in the school library. These students were provided guidelines, practice, and coaching in selecting appropriate books and vocabulary words. Book selection criteria included a sense of story or interesting information, rich vocabulary, and engaging pictures. Words targeted for discussion needed to be meaningful. The older students spent four sessions locating books that they felt were appropriate for DBR. The older students then worked in pairs to determine which books met the book selection criteria and which needed to be discarded. During the next four sessions, pairs read through the books and noted words that would work as targeted vocabulary by marking them with a sticky note. The researcher facilitated the older student discussions offering guidance as necessary.

The next twenty 15 minute sessions of first stage of DBR training involved learning how to facilitate DBR. To start, the students viewed the 30-minute video, Read Together Talk Together (Pearson Early Learning, 2002) from beginning to end. They then revisited different aspects of the video as they viewed live modeling and role-played with peers using the books and words previously selected. Additionally, the students were provided with a guide to scaffold them in the DBR (Appendix A), which was also used during training and during the intervention. The researcher used the DBR observation checklist (Appendix B) to provide ongoing feedback to the role-playing pairs during the last week of October and the first week of November.

The second phase of the DBR training began the second week of November. The older reading buddies began to implement the dialogic techniques with their preschool aged partners using books selected from the classroom library. The researcher individually coached all the pairs that made up the selection pool using the DBR observation checklist during the months of November, December, and January.

Delivery and data collection phase.   Six pairs were randomly selected for data collection in early February. While the relevant data for this paper is focused on fidelity to implementation, data was also collected on vocabulary learning as part of the larger study. The pairs of older students and Head Start students spent two weeks introducing and providing one read each of six books*: Growing Vegetable Soup*, *Harry the Dirty Dog*, *How Does a Dinosaur Go to School*, *The Runaway Bunn*y, *Is Your Mama a Llama*, and *Corduroy*. The preschool student then chose three books they wanted to use during the intervention period. Finally, a unique vocabulary measure was developed for each of the six preschool students based on their book selections by late February. Bookmarks were created to scaffold and target the vocabulary words using the DBR protocol. An example of a bookmark for one story is included in Appendix C. The purpose of the bookmark was to target specific vocabulary for the purpose of determining if the DBR protocol could be connected to the learning of those specific words—an aspect of the broader project that is detailed in another work. Therefore, bookmarks were only used when reading those specific texts. However, fidelity observations were conducted across the duration

of the study regardless if book being read were part of the vocabulary study or others chosen from the classroom library.

The intervention period used the following format. Each pair worked with the selected books for five weeks. One of the three selected titles was reintroduced each of the first three weeks. The pairs were required to read the targeted book for the week at least once each day. The pairs read one to two books per reading session, so the targeted book was read every day during that week plus another book. The targeted book was kept in a book box delegated for the pair after it was reintroduced so that the pairs could use it again in subsequent weeks if they so chose. Each preschool student was administered the vocabulary measure once a week during the five week period. The six pairs were organized into three distinct groups. The start time for each group's five-week intervention period was staggered every two weeks.

A graphic display of the timeline for the intervention and data collection can be found in Appendix D. Each bar represents a pair. The bar is divided into five sections, one section for each week. The dates for the week, the title of the book introduced, the targeted words for that book, and the dates for the vocabulary probe and fidelity observation are noted in each section. There was a total of nine weeks of data collection during the intervention phase.

The researcher observed each of the six pairs at least once a week during the nine-week data collection period during March, April, and the first two weeks of May. This period provided eight observation checks for each pair. Each observation was audio recorded as the checklist was applied. The audio allowed for reliability to be calculated, which is described in the next section. The fidelity protocol checklists were analyzed for each pair. This analysis focused on the number of complete DBR cycles per observation and a notation of the components neglected. A visual graph representing the fidelity measure was constructed for each set of dyads.

Reliability

An inter-rater agreement was calculated in order to ensure accuracy of the measures. Twenty-five percent of the 48 recorded fidelity observations were selected. Two observation checklists were randomly pulled for each pair. The audio recordings of these sessions were transcribed. Another researcher familiar with DBR applied a fidelity checklist to each of the transcripts. The checklists completed by the outside researcher were compared with those of the researcher in order to tabulate the number of agreements and disagreements. The inter-rater agreement ratio was calculated by dividing the total number of agreements between the researcher and the observations provided by an outside analyst across all pairs. This number was then divided by the number of agreements plus the number of disagreements, and multiplying that number by 100 (Briesch et al., 2008). The inter-rater agreement ratio was .71 for the fidelity measure.

Validity

Threats to internal validity were addressed by paying very close attention to the delivery, receipt and enactment of DBR. Observations using the fidelity checklist provided insights into to what degree the sixth grade students could use the DR protocol during delivery and receipt of DBR. Interview data further supported internal validity, showing that sixth grade students shifted in their understanding of how to conduct DBR and why it is important to the younger buddy.

Threats to external validity were minimized through the detailed description of diverse participants. Additionally, the study design included two opportunities for replication of effects by staggering the start of the use of DBR techniques across dyads, with each dyad consisting of two buddy pairs.

RESULTS

The observational data is analyzed across pairs in order to develop a cross case synthesis of overall fidelity findings. First, each observation is broken down to assess the extent the critical components of the PEER cycle were used by each pair. The graphs displaying this data are displayed in Figure 1. A second analysis is then summarized in Figure 2, indicating the percentage of components used and the percentage of completed cycles across pairs, both with and without the use of the more detailed support of the targeted vocabulary bookmark. The observation breakdowns and synthesis are followed by a summary of the vocabulary probe results, which are detailed in another work (McIlwain & Burns, 2014) and a summary of a sustainability exploration, also detailed in another work (McIlwain, 2012). The vocabulary and sustainability summaries are included to better understand what level of fidelity to implementation might be needed to influence positive outcomes in vocabulary learning and what supported or hindered fidelity to implementation—helping to define potential leverage points for improvement of both the program and the implementation of the program over time and across contexts.

Cross Case Analysis of Fidelity to the DBR Protocol

Taken together, the results for pairs one (Ashley and Maria) and two (Lizzie and Sashi) indicate that fidelity to DBR is observable and measureable for sixth grade students working with preschool children. The number of initiated cycles increased when the older student used the bookmark; however, Ashley and Lizzie also initiated cycles when reading books that did not require the use of a bookmark for targeted vocabulary (observations one through five). The number of complete cycles increased when scaffolded with this visual support for Lizzie; however, the same is not true for Ashley.

As with pairs one and two, the graphs for pairs three (Jenny and Jeremy) and four (Ferrel and Don) indicate that fidelity to DBR is an observable and measureable goal for sixth grade students. The graphs indicate an upward trend in the number of components used in each DBR cycle. Also, Ferrel began using the extended and repeat components more often in each subsequent check. The increased number of initiations and components began when the students were required to use the bookmarks to target vocabulary (observations three through seven), but they also continued once the bookmarks were no longer required.

To continue the trend, observation breakdowns for pairs five (Noora and Marion) and six (Julia and Paige) also indicate that fidelity to DBR is observable and measureable in the elementary school setting. Both pairs improve in number of initiations and number of components used across observations. Noora showed improvements in number of initiations and completed cycles before the bookmark requirement began in observation four; and Julia showed a bit of an implementation dip, but quickly recovered and returned to an upward trend in initiated

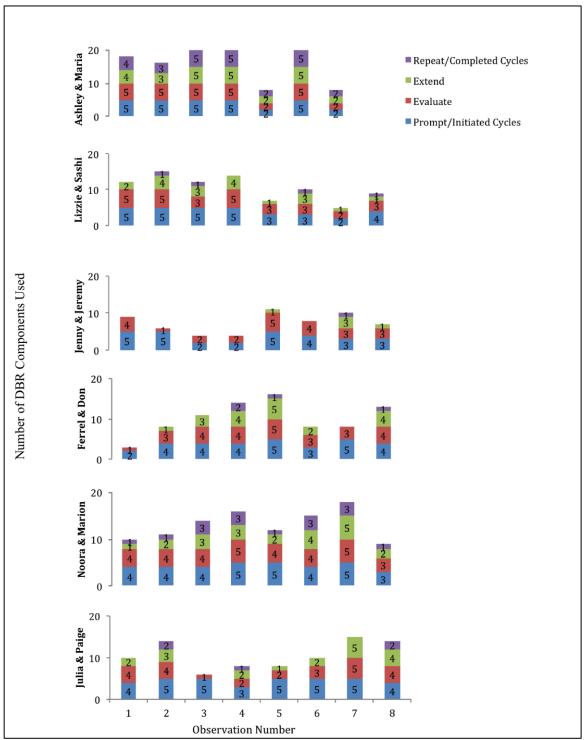cycles, number of components used and completed cycles.

Figure 1. Fidelity Graphs For Each Pair

A summary of the individual visual analyses of the fidelity graphs for pairs one through six consists of two different trends, number of available components used per DBR cycle and number of completed cycles. Lizzie and Sashi, Jenny and Jeremy, Ferrel and Don, and Julia and

Paige showed an upward trend in the number of components used for each DBR cycle. Lizzie and Sashi demonstrated this trend only when supported with the additional bookmark scaffold that targeted vocabulary. Ashley and Maria and Noora and Marion showed an upward trend in completed cycles. Figure 2 shows these two trends in terms of the percentage of available components used and percentage of completed cycles per observation with and without the bookmark scaffold. The training and scaffolds supported student use of DBR in varying degrees, but measurable trends are present, which gives researchers a sense of what fidelity might look like if DBR is studied further and across multiple contexts.
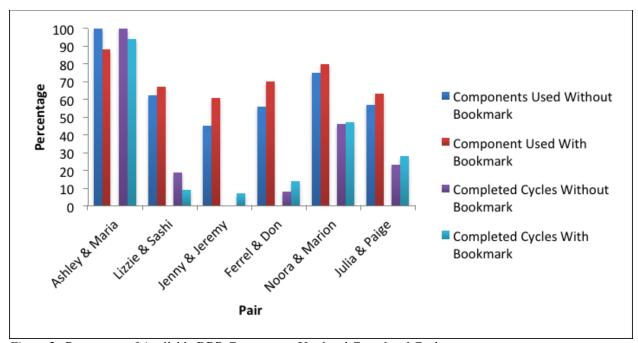

Figure 2. Percentage of Available DBR Components Used and Completed Cycles

Summary of Related Vocabulary Outcomes

The bookmarks were used during the weeks students were reading books with the targeted vocabulary. The detailed report about how vocabulary was studied is included in another dissemination of the project (McIlwain & Burns, 2014). The question explored the influence of DBR on the receptive and expressive vocabularies of preschool students. The vocabulary measure indicated a positive overall trend in increasing receptive vocabulary for each of the dyads (one dyad consisting of two pairs), although the paths to these gains varied. Words learned before DBR introduction versus words learned after DBR were analyzed for the number of specific words retained by the preschool students after DBR to substantiate positive influence of DBR. This analysis showed one trend in dyad 1 (pairs 1 and 2), which was replicated in varying degrees in dyad two (pairs 3 and 4) and dyad three (pairs 5 and 6). The trend indicated that the words correct before DBR introduction remained constant in actual words and number of words, whereas the words learned after DBR increased in number and were constant across probes. Therefore, DBR appears to have provided a scaffold that enabled preschool students to grow in receptive vocabulary.

The results on the vocabulary measure also indicated a positive overall trend in increasing expressive vocabulary for five of the students.   Words learned before DBR introduction versus words learned after DBR, as well as shifts in the students' responses, were analyzed for constancy in number and specific words to substantiate positive influence of DBR. This analysis demonstrated a trend for student one in dyad one, which was replicated in varying degrees in dyads two and three. The trend indicated that DBR did exhibit a positive influence on expressive word learning, although the number of words learned varied from one to six among the individual preschool students. Therefore, sixth grade students were able to consistently and successfully facilitate DBR, which enabled preschool students to grow in expressive vocabulary.

Summary of Sustainability Exploration

The sixth grade students and participating Head Start teacher were interviewed pre and post delivery of the intervention to explore the sustainability of DBR. Sustainability is based on the level of fidelity to DBR that can be attained and maintained over time and is a function of social validity, which is comprised of the social value of the intervention's effects and the practicality of the intervention's procedures (Horner et al., 2005). Figure 3 depicts the relationship between the highlighted themes found in the interview data. These themes are presented as "effects" and process considerations in a system of interdependent elements.
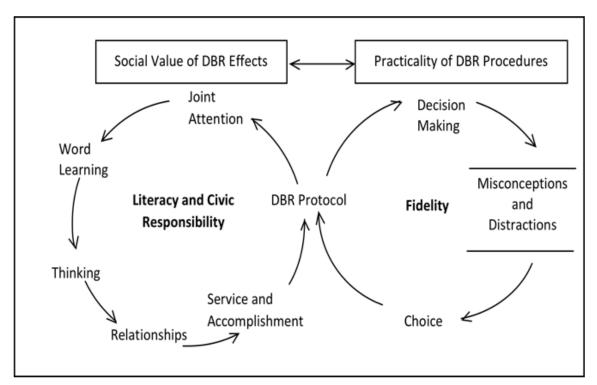

Figure 3. The Social Value and Sustainability of DBR.

Systems thinking (Senge, 1994) explains actions through interrelated components or elements. Understanding the interrelated components of a system allows for the development of

strategic changes to be made to the system in order to develop and maintain the system's production of wanted outcomes. These strategic changes are usually made at the leverage point of the system, often located at the delay (a point in the system that is underdeveloped), which create a sustainable program.

Figure 3 indicates that the effects develop literacy and civic responsibility in the participants. The practicality of the procedures involves fidelity to DBR and the focus of the students. Literacy and civic responsibility can be viewed as connected to fidelity through the use of the DBR protocol.

The analysis of the interview data indicated that the DBR protocol appears to promote joint attention, vocabulary or word learning, thinking, relationships and a sense of accomplishment. The DBR protocol also appears to facilitate the decision-making that leads to those noted outcomes. However, misconceptions regarding the purpose of DBR and distractions interrupted the influence of decision-making while using the protocol for some of the participants. The older participants voiced one option for addressing one aspect of the delay (distractions), which was to offer more collaborative choice between the older and younger students in book selection. Providing more choices could increase interest, focus and potentially facilitate adherence to the DBR protocol more successfully by supporting decision-making that would sustain the buddy reading pairs through each step of the PEER protocol. Thus, incorporating more choice could begin to leverage the sustainability of DBR, a buddy reading program that has social value and practicality. Other ways to minimize the delay and increase fidelity and focus of the procedures will be presented in the discussion.

DISCUSSION

Evidence-based practices can be transferred to the "real world" of classrooms by recognizing and using the resources available in any given context. The construct of implementation science brings with it tools that can increase any given practice's effectiveness in such classrooms: most importantly, the flexible adherence (Harn, Parisi, & Stoolmiller, 2013b) to the structures and processes of the particular practice based on the needs of the specific children and teachers using the practice. The present study detailed how such a transfer occurred in the case of transforming DR, a practice used in homes and controlled classroom environments, to DBR, a practice used in real classrooms using sixth grade students and students in Head Start.

This first effort at DBR looked at sixth graders' implementation of DBR and sought to determine what fidelity might look like and how it might be measured. The critical components of DBR are identical to those well researched in the DR literature: prompt, evaluate, extend and repeat. These components are easily identifiable through observation and just as easily documented through the use of the fidelity observation checklist. Results shared in this research showed fidelity to implementation varied across pairs, but also showed upward trends in the number of initiations, number of components used and number of completed cycles. In spite of the varied levels of fidelity, all preschool students increased in their word knowledge, albeit the measureable increases were small. However, vocabulary growth on the part of the younger students in DBR is not necessarily limited to the targeted words. That being said, vocabulary growth even of the targeted words will most likely be positively affected if the leverage points identified in the sustainability exploration are addressed by making some changes to how DBR is established as a routine in any given context.

Based on this implementation of DBR, in which 17 pairs of students excitedly met four days a week in one very energized classroom for only 15 minutes a session, the leverage points are distractions and misconceptions about the purpose of DBR. These leverage points were determined through interviews with six of the older students and corroborated through the fidelity observations. The defined misconceptions are extended by the researcher's ongoing reflection on the observations to include more understanding of the importance of bringing each initiation of a DBR cycle to completion by getting to the repeat. The students themselves provided a viable solution to distractions and the researcher and teacher discussed using ongoing coaching as a way of developing the students' conceptual understanding of the purpose of DBR and how it is most effectively implemented. This coaching can be done in conjunction with the observation checklist, perhaps adding a space for noting the coaching prompt and the student's response. To conclude, fidelity to implementation of the critical components of DBR can be measured using an observation checklist and its delivery may be enhanced by creating a system of flexible and systematic adaptations to the processes established in the specific context. The latter adaptations and processes can be determined and refined through systematic conversations that take the participants back to the observation data.

Systemic implementation of DBR in schools carries great potential for preschool students. DR is an evidence-based practice that positively influences a young child's vocabulary, linguistic complexity and use of language. Making DR a daily routine in Head Start programs as DBR will reach more children at risk of running into reading difficulties before those struggles have the opportunity to emerge.

Limitations to consider when replicating this study are finding ways to incorporate initial observations of reading interactions between the older and younger students so the influence of the DBR training can be described. Also, future measures should include interview questions that elicit information about the sixth grade students' understanding of the primary purpose of DBR and why DBR is so effective with young children. Analysis of data based on these questions would inform ongoing coaching during implementation.

As with DBR, adjusting the ideals of fidelity by embedding these into a systemic examination of the implementation of other evidence-based practices across contexts via implementation science will allow interested stakeholders to study not *if* that practice is effective in their context, but ***how to make*** that practice effective in their context. Disseminating implementation science research such as this will help others replicate the successful implementation of evidence-based practices across multiple, diverse contexts.

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APPENDIX A

PEER

FIRST: Read the story in three sessions without using the peer and crowd guide.

NEXT: Plan the CROWD prompts you will use with the PEER guide.

Step 1: Think about the child's understanding of the words noted inside the cover of the book. Choose 6 – 8 words.

Step 2: Review the CROWD prompts for the vocabulary words you chose. Decide which prompts will work best for your buddy and place the stickies on the pages where the words are used.

Step 3: Read with your buddy using the PEER guide for each sticky.

LAST: Congratulate yourself and your classmates for a job well done!

	C	R	O	W	D
P = PROMPT	...said the great, huge bear, in his great, *loud* voice.	Tell me what the great huge bear said when he saw his chair. *She is in my chair.*	Why is the great, huge bear's voice so **rough**? *He is big.*	Who has a **rough** and gruff voice? *The bear.*	Tell me about a time when you used a **rough** and gruff voice. *I don't know.*
E = EVALUATE	It probably was loud and **rough**, too!	Goldilocks did sit in his chair!	Yes, he is big and he looks strong.	Yes, one of the bears has a **rough** and gruff voice.	I used one when my brother took my toy. I said....... I should have been nicer, but I was mad. What makes you mad? *When my friend takes my stuff.*
E = ENHANCE	A **rough** voice will sound scratchy like this......How do you think the great, huge bear sounded?	He said, "Somebody has been sitting in my chair!" in a great, **rough**, gruff voice.	His voice isn't always **rough**, though. It's **rough** because he is big, strong and angry! Listen to my angry voice. Show me your angry voice.	The great, huge bear has a **rough** and gruff voice. He must have sounded like this....You try to sound **rough** like the great, huge bear.	I bet you made your voice sound **rough** when your friend took your stuff and didn't share.
R = REPEAT	The great, huge bear talks in a great, _____ voice.	What did the great, huge bear say when he saw his chair?	Why do you think the great, huge bear's voice is so **rough**?	Who has a **rough** and gruff voice?	Tell me about a time when you used a **rough** and gruff voice.

CROWD Together With Goldilocks and the Three Bears

C = Complete

 "Someone has been sitting in my chair!" said the great, huge bear, in his great,_____, gruff voice.

R = Recall (Retell)

Tell me what the great, huge bear said
when he saw his chair.

O = Open-ended (Deep Questions)

Why is the great, huge bear's voice so rough?

W = Wh- questions (Shallow Questions)

Who has a rough and gruff voice?

D = Distance (Connections)

Tell me about a time you used a rough voice?

APPENDIX B AND C

trowel

Choose one prompt. Use PEER in a way that encourages your buddy to use the target word.

Cloze
Gardeners dig little holes with a

_____ .

Recall
What does a gardener use to dig the little holes for the sprouts?

Open Ended
What is going on in this picture? (Use PEER to guide the student to use the word, trowel.)

WH- Questions
What is this called? What is it used for? (point to the trowel)

Distance (Connections)
I remember using a trowel to help plant flowers with my mom. Tell me about a time when you planted something. (Try to guide student to use "trowel" trough PEER).

APPENDIX D – DATA COLLECTION CHART

Data Collection Chart For Pairs One through Four

Week	1: 3/1-3/4	2: 3/8 – 3/11	3: 3/15 – 318	4: 3/22 – 3/25	5: 4/5 – 4/8	6: 4/12 – 4/15	7: 4/19-4/22	8: 4/26-2/29	9: 5/3-5/6	10: 5/10-5/13
Pair 1										
Title	Harry the Dirty Dog	Growing Vegetable Soup	The Runaway Bunny	Rereads /choice	Rereads /choice	choice	choice	choice	choice	
Words	buried, begging, following, gate	ladle, hand basket, cabbage, hoe	Gardener, stream, trapeze, catch	no new words	no new words	no new words	no new words	no new words	no new words	
Probe	3/8	3/12	3/24	3/26	4/9	no probe	no probe	no probe	no probe	
Obs.	no obs.	3/9	3/16	3/22	4/6	4/15	4/22	no observation	5/4	
Pair 2										
Title	How Does a Dinosaur …School	Is Your Mama a Llama?	Corduroy	Rereads/choice	Rereads/choice	Choice	Choice	Choice	Choice	
Words	Growl, roughhouse, leaps, fuss	Lashes, whiskers, grazes, seal	overalls, palace, escalator, sofa 3/13	no new words	No new words	no new words	no new words	no new words	no new words	
Probe	3/8	3/12	3/16	3/26	4/9	no probe 4/15	no probe 4/21	no probe no observation	no probe 5/5	
Obs.	3/1	3/9		3/22	4/6					
Pair 3										
Title	Choice	Choice	Harry the Dirty Dog	Corduroy	How Does a Dinosaur…School	Rereads/ choice	Rereads/ choice	Choice	choice	
Words	no new words	no new words	buried, hidden, following, dashed	Overalls, palace, escalator, toppled	leaps, fuss, roughhouse, growls 3/25	no new words	no new words	no new words	no new words	
Probe	no probe	no probe				4/8	4/15	no probe	no probe	
Obs.	3/3	3/10	3/19 3/17	3/23 no observation	4/6 4/15	4/15	4/19	4/26	5/6	
Pair 4										
Title	Choice	Choice	Harry the Dirty Dog	How Does a Dinosaur …School	Growing Vegetable Soup	Rereads/ choice	Rereads/ choice	Choice	choice	
Words	No new words	no new words	Hidden, railroad, flipped, begging	Tail, leaps, fuss, chalk	Sprout, steam, soil, trowel	no new words	no new words	no new words	no new words	
Probe	No probe	no probe				4/16	4/26	no probe	no probe	
Obs.	3/3	3/10	3/23 3/18	3/26 no observation	4/9 4/7	no observation	4/19	4/26	5/4 and 5/13	

Data Collection Chart for Pairs Five and Six

Week	1: 3/1-3/4	2: 3/8 – 3/11	3: 3/15 – 318	4: 3/22 – 3/25	5: 4/5 – 4/8	6: 4/12 – 4/15	7: 4/19-4/22	8: 4/26-2/29	9: 5/3-5/6	10: 5/10-5/13
					Pair 5					
Title	Choice	Choice	Choice	Choice	Choice	Harry the Dirty Dog	Growing Vegetable Soup	Corduroy	Rereads/ choice	Rereads/ choice
Words	no new words	no new words	no new words	no new words	no new words	Dashed, hidden, buried, begging	Trowel, bud, ladle, bushel	Escalator, gasped evening, yanked,	no new words	no new words
Probe Obs.	no probe no observation	no probe 3/8 and 3/11	no probe 3/18	no probe 3/25	no probe 4/8	4/20 4/12	4/29 4/20	5/4 no observation	5/11 5/3	5/18 5/10
					Pair 6					
Title	Choice	Choice	Choice	Choice	Choice	Growing Vegetable Soup	How Does a Dinosaur ...School	Harry the Dirty Dog	Rereads/choice	Reread/choice
Words	no new words	no new words	no new words	no new words	no new words	Bud, trowel, hoe, stake	Leap, roughhouse, interrupt, projects	Hidden, begging, buried, chute	no new words	no new words
Probe Obs.	no probe no observation	no probe 3/8 and 3/11	no probe no observation	no probe 3/23 and 3/25	no probe 4/8	4/16 no observation	4/26 4/20	5/5 4/27	5/11 no observation	5/18 5/13