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The Effects of a Language and Literacy Intervention on Head Start Children and Teachers

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A language and literacy intervention was implemented in 10 Head Start classrooms. Teachers were trained in specific book reading and conversation strategies. The focus of the intervention was to train teachers how to increase opportunities for language and vocabulary development in young children. At the end of the year, children in the intervention classrooms performed significantly better than children in the control classrooms on the Peabody Picture Vocabulary Test—III and the Expressive One-Word Vocabulary Test (3rd ed.). In addition, teachers in the intervention classrooms used strategies that promoted language development during book reading and other classroom activities. Head Start teachers can be trained to implement strategies that have positive effects on children's language and literacy development.

Keywords: language, literacy, intervention, Head Start, vocabulary

In the past 15 years, increased attention has been paid to the preschool years as a critical time for developing skills that are needed to succeed in school. Three recent National Research Council reports—*Eager to Learn: Educating Our Preschoolers* (Bowman, Donovan, & Burns, 2000), *From Neurons to Neighborhoods: The Science of Early Childhood Development* (Shonkoff & Phillips, 2000), and *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998)—have documented the significance of early experiences on later development and the effects that these experiences have on school achievement. The research summarized in these reports and documented in the scientific literature consistently shows that language and preliteracy development has a profound effect on young children's successful transition to school and, in particular, on their success in learning to read (Dickinson & Tabors, 2001; Whitehurst & Lonigan, 2001). Children who arrive in first grade with a foundation in preliteracy skills and the interest and motivation to learn are better prepared to engage in the complex task of learning to read compared with children who lack these foundational skills (Whitehurst & Lonigan, 1998).

Preliteracy skills consist of complex interrelationships among code-related and oral language skills (Dickinson, 2001; Storch & Whitehurst, 2002; Whitehurst & Lonigan, 1998). Code-related skills include knowledge of conventions of print (e.g., knowing that writing goes from left to right), beginning forms of writing (e.g., writing one's name), letters and letter sounds, and phonological awareness (e.g., that the word *mat* begins with the /m/ sound; Storch & Whitehurst, 2002). Oral language skills include word knowledge, expressive and receptive vocabulary, knowledge of syntax, and conceptual knowledge (Vellutino, Scanlon, & Spearing, 1995; Vellutino, Scanlon, & Tanzman, 1991). Researchers have clearly documented the importance of code-related skills in learning to read (Beck & Juel, 1999; Stanovich & Siegel, 1994). Although there has been some controversy over the exact nature of the relationship between oral language and literacy development (Bryant, MacLean, & Bradley, 1990; Roth, Speece, Cooper, & de la Paz, 1996; Speece, Roth, Cooper, & de la Paz, 1999), there is strong evidence indicating that oral language plays a critical role in laying the foundation for literacy skills (Catts, Fey, Zhang, & Tomblin, 1999; Chaney, 1998; Metsala, 1999) and that the contributions that code-related skills and oral language make to learning to read can vary at different points in development (Whitehurst & Lonigan, 1998). Data from longitudinal studies indicate that oral language is an essential precursor to learning to read (Dickinson & McCabe, 2001; Storch & Whitehurts, 2002).

Most children acquire language and preliteracy skills through interactions with adults and peers who use language in ways that are consistent with the majority culture and correspond to the printed word (Dickinson & Tabors, 2001; Strickland, 2001; Wells, 1986). Unfortunately, many children raised in poverty have limited access to opportunities to develop language and literacy skills in such ways (Snow et al., 1998; Wells, 1986). As one important illustration, Hart and Risley (1995) reported that by the age of 3, children in poverty were already well behind their more affluent peers in their acquisition of vocabulary and oral language skills. Snow et al. (1998) also reported that children in poverty lack necessary preliteracy skills at the beginning of kindergarten. Similar research indicates that socioeconomic status is the strongest predictor of performance differences in children at the beginning of the first grade (Alexander, Entwisle, & Horsey, 1997) and that this gap persists as children progress from elementary to high school (Puma et al., 1997).

Explanations vary as to why children in poverty have limited language and literacy skills (see Tabors, 1997, for a discussion).

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Wells (1986) argued that there is an incongruity between the expectations of the home and of school with regard to language development. On the basis of his longitudinal study of 32 high-, middle-, and low-income children, Wells found that many of the language deficits of the children from low-income homes were due to the low value parents placed on literacy, as evidenced by parents' limited use of literacy skills and the absence of books in the home. Neuman and Celano (2001) argued that inadequate access to books and other literacy opportunities contributed to children in poverty not acquiring the language and literacy skills needed to succeed in school. In an ethnographic study conducted in high-poverty neighborhoods in Philadelphia, Neuman and Celano found that poor children had little access to literacy materials. With respect to communicative exchanges, Hart and Risley's (1995) findings suggest that children of middle-class, well-educated parents have two to three times as many opportunities to converse with their parents as low-income children.

With the concern of limited language and literacy opportunities in low-income homes, more emphasis has been placed on instruction in preschool classrooms. Research on early literacy and classroom practices has shown two important findings. One is that the opportunities for language and literacy in preschool classrooms that serve low-income children are also limited. Bryant, Burchinal, Lau, and Sparling (1994) observed Head Start classrooms using the Early Childhood Environment Rating Scale (Harms, Clifford, & Cryer, 2003) and found that the lowest scores were on the language and literacy subtests, indicating few opportunities for literacy learning. Dickinson and his colleagues (Dickinson, 2001; Dickinson & Tabors, 2001), as part of the Harvard Home-School Study of Language and Literacy Development (HSLLD), observed preschool language and literacy environments of 74 low-income children. Despite the well-known benefits of book reading, teachers read on average less than 8 min per day, with only 4% of teachers reading more than 20 min per day. Similarly, recent data from the Early Child Care Research Network indicated that classrooms serving low-income children did not provide optimal support for language and literacy learning (NICHD Early Child Care Research Network, 2000).

The data from the HSLLD (Dickinson & Tabors, 2001) also showed that children and teachers spend relatively little time in classrooms engaged in conversations. Audiotapes of 4-year-olds revealed that during a free-play activity, children spent about 17% of the time engaged in meaningful conversations with their teacher and 18% of the time talking with another child. Fifty-nine percent of the time was spent not talking at all. Children learn to use language by engaging in dialogue; limited opportunities to talk and receive feedback will limit language development.

The second important finding is that high-quality preschool interventions can have a positive impact on high-poverty children's general cognitive abilities and reading achievement (Barnett, 2001). For example, the well-documented Abecedarian project has shown the short- and long-term positive impact of an intensive early intervention program on children's reading achievement and general cognitive ability (Campbell & Ramey, 1994). Similar findings were found for the Perry Preschool project that provided quality preschool experiences for high-poverty preschoolers (Barnett, Young, & Schweinhart, 1998).

As the foregoing arguments and evidence suggest, providing opportunities for children to talk and develop language skills is an important aspect of high-quality programs and effective interventions (Wasik, Bond, & Hindman, 2002). Peterson, Jesso, and McCabe (1999) trained low-income mothers to spend more time in narrative conversations with their children and to ask more open-ended and context-eliciting questions. Children in the intervention group showed significant vocabulary improvement immediately after the intervention and improvement in narrative skills a year after the intervention. Beals (1997) examined mealtime conversations of preschoolers and their families. Conversations that included the use of unfamiliar words contributed to children's learning of those words. Of the 1,631 exchanges around unfamiliar words, two thirds were used in ways in which the children could learn the meaning of words. Hence, the adults created a context for vocabulary learning. Children's frequency of use of these unfamiliar words was positively correlated with the Peabody Picture Vocabulary Test—Revised (PPVT–R; Dunn & Dunn, 1981) scores at ages 5 and 7. Once again, the findings suggest that conversations with young children can support vocabulary development.

As Snow (1983) pointed out, book reading provides a context that supports dialogue and contributes to vocabulary development, particularly because of the opportunities book reading offers to become exposed to unfamiliar words that a child would not typically encounter in his or her everyday experiences. In a series of influential studies, Whitehurst and his colleagues (Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994; Whitehurst et al., 1988) demonstrated the effects of a systematic shared book reading program, called *dialogic reading*, on children's language and literacy skills. *Dialogic reading* is a method of reading picture books in which children are provided with multiple opportunities to talk and engage in conversation while the adult becomes an active listener, asks questions, adds information, and promotes the child's use of descriptive language. In the first of several studies, Whitehurst et al. (1988) investigated the impact of middle-income parents using dialogic reading techniques while reading one-to-one with their children. After a 1-month intervention, posttests on the PPVT–R and Expressive One-Word Picture Vocabulary Test (3rd ed.; EOWPVT–III; Brownell, 2000) indicated effect sizes of 0.69 and 1.10, respectively. Nine months after posttesting, children were tested on the same measures, yielding an effect size of 0.01 for the PPVT–R and 0.79 for the EOWPVT–III. Similar findings using different intervention techniques have been reported by Hargrave and Senechal (2000) in which dialogic reading was compared with regular reading in groups of high-poverty preschool children.

In a subsequent study, Whitehurst, Arnold, et al. (1994) examined the impact of using dialogic reading strategies on low-income children's language and literacy development in three conditions: at home, in day care, and in both settings. During the 6-week intervention, day-care teachers read daily for approximately 10 min, and parents were given books to read at home; both parents and teachers were trained in dialogic reading techniques. The results indicated that for the PPVT–R, there was an effect size of 0.13 for the day-care-only condition and 0.24 for the day-care-plus-home-reading condition. For the EOWPVT–III, the effect sizes were 0.18 for day care only and 0.43 for day care plus school. Hence, the double dose of reading in day care and at home had a stronger impact on students' scores.

In a follow-up study, Whitehurst, Epstein, et al. (1994) investigated the impact of implementing dialogic reading both at home and in school in Head Start centers, which serve high-poverty children and their families. Children in the intervention group received dialogic reading three to four times a week in small groups (e.g., 4 children to one adult) in the centers during a school year. In addition, parents were trained in dialogic reading strategies and were encouraged to read the book that was sent home at least three times with their child. Children were administered an extensive battery of tests that tapped four skills: writing, print concepts, language, and linguistic awareness. Results of the analysis of variance that compared the intervention and control groups indicated that the intervention group scored significantly higher compared with the control group on writing and print concepts but not on the linguistic awareness factor or the language factor, which comprised the PPVT–R and the EOWPVT–III. Hence, it appears that the significant language effects found when dialogic reading was undertaken in middle-class families and in day care were far greater than those that resulted when these practices were implemented in a group setting in Head Start classrooms. There is clear evidence that dialogic reading is effective in certain contexts. However, in the conditions described in Whitehurst, Epstein, et al. (1994), there is some evidence to suggest that there was less of an impact on language and linguistic awareness than on writing and phonemic awareness.

One reason for the lack of impact of dialogic reading on Head Start children's language skills could be that the amount of time during the book reading was not sufficient for children with limited background knowledge to acquire the unfamiliar words. Some studies suggest that kindergartners who heard a word four times during book reading were more likely to learn the new word compared with children who only heard the word twice (Robbins & Ehri, 1994). Also, repeated exposures to a book along with teacher explanations of unfamiliar vocabulary words can contribute to children learning new vocabulary words (Penno, Wilkinson, & Moore, 2002). In studies such as these, however, these strategies were not as effective with children who had low vocabularies, suggesting that additional interventions need to be implemented for high-poverty children.

As noted earlier, data from the HSLLD (Dickinson & Tabors, 2001) has shown that children and teachers spend relatively little time in classrooms engaged in conversations (e.g., only 17% of the time engaged in meaningful exchanges). Children learn to use language by engaging in dialogue; limited opportunities to talk and receive feedback will limit language development. Although the book reading experience is necessary, it may not be sufficient to develop language skills in high-poverty children.

In order to increase the opportunities for children to hear and use the vocabulary words presented beyond the book reading experience, Wasik and Bond (2001) developed an intervention that allowed children to have multiple encounters with vocabulary words from a book reading. Teachers from Title I preschools were trained in a series of questioning strategies similar to dialogic reading, which focused on asking open-ended questions, providing descriptions of unfamiliar vocabulary, and relating the book and vocabulary to children's experiences. In addition, teachers had props that represented the vocabulary words that they were focusing on from the storybook. To create opportunities for vocabulary use beyond the book reading class experience, we designed art and other center-related activities so that (a) the activities were related to the books, (b) the activities provided a natural context for both the teacher and child to use the book-related vocabulary words, and (c) the teacher was trained to use the vocabulary multiple times throughout the activities. An experienced preschool teacher, who was assisting with the research, conducted the training. The trainer modeled the interactive book reading strategies for the teachers and also assisted with the center extension activities for 4 weeks of the 15-week intervention. During the remaining weeks, the intervention teachers did the book reading and extension activities without the trainer. The results showed that the intervention classrooms performed significantly better than the control classrooms on the Peabody Picture Vocabulary Test—III (PPVT–III; Dunn & Dunn, 1997), $F(1, 20) = 13.69$, $p < .001$. The intervention group also performed significantly better on expressive and receptive language assessments that were constructed on the basis of target words that the children were exposed to during the intervention.

Although these results were clearly promising, there were several limitations to the Wasik and Bond (2001) study. First, there were only two teachers included in the intervention. It would be important to know whether these findings can be generalized to a larger sample of teachers. Second, the children were from a Title I preschool where the level of poverty is not as great as in Head Start classrooms. It would be important also to determine whether this intervention was effective with the most at-risk population of children. Third, Head Start teachers have varying skill levels. For example, the HSLLD study by Dickinson and colleagues (Dickinson, 2001; Dickinson & Tabors, 2001) suggested that the typical Head Start classroom might not provide the kinds of language and literacy opportunities that disadvantaged children need to enhance their skills. It is important to understand the amount and degree of training that is necessary to ensure that Head Start teachers are creating opportunities for children to have language and literacy experiences.

The present study had several goals. The first goal was to determine whether the intensive language and literacy intervention designed by Wasik and Bond (2001) would have a similar effect in settings comprising Head Start teachers and primarily disadvantaged children. The second goal was to determine whether training could influence how teachers talked to children. Third, in addition to focusing on book reading, the current intervention trained teachers to use discourse strategies that tend to increase oral language opportunities for children at other times during the school day. Using discourse strategies in activities other than book reading is essential for language development. The fourth goal of the study was to determine whether the impact of the intervention could be generalized when larger samples of teachers are involved. Finally, in addition to determining whether the Wasik and Bond approach could be effective in Head Start contexts, we conducted exploratory analyses of possible linkages between teacher behaviors and outcomes. These analyses were intended to lay the groundwork for future experimental studies that examine uncovered factors more systematically.

To accomplish these goals, we significantly altered the teacher training materials used by Wasik and Bond (2001) to fit the needs of Head Start teachers and to be implemented with a larger pool of teachers as well as teachers with more limited background knowledge regarding language and literacy development. Teaching lan-

guage and literacy skills to young children is a relatively new activity for Head Start teachers. With the reauthorization of Head Start in 1998, there was an increased emphasis on teaching language and literacy skills. Given the novelty of this approach and training of the typical Head Start teacher, it was expected that translation of these initiatives into classroom practices would take some time. The training modules include direct instruction of specific strategies, modeling of these strategies, and providing feedback to teachers. The training is described more fully in the *Procedure* section.

Method

Participants

Two Head Start centers were selected to participate in the intervention. Sixteen teachers participated in the project, 10 in the intervention group and 6 in the control group. Of the 10 teachers in the intervention group, 4 teachers had their bachelor of arts degree, 3 teachers had their associate of arts degree from a 2-year community college, and 3 teachers had a child development associate certificate. One of the teachers with the associate of arts degree was working toward her bachelor of arts degree. The years of teaching experience ranged from 3 to 32, with an average of 15 years. In the control sites, all 6 teachers had their bachelor of arts degree, and the years of teaching ranged from 1 to 17 years, with an average of 7 years.

Two hundred seven children, 139 in the intervention and 68 in the control group, participated in the study. In certain analyses to follow, however, missing data on one or more variables (e.g., alphabet knowledge) decreased the total sample to a range of 191 to 202 (depending on the variable). The mean age for the fall was 3 years 10 months, with children's ages ranging from 2 years 8 months to 4 years 10 months. The Head Start centers are located in high-poverty neighborhoods, and the income eligibility criteria to receive Head Start services range from $8,980 and below for a family with one child to $30,960 for a family with eight children. Ninety-nine percent of the children were African American.

Procedure

Two centers were randomly assigned to the intervention and the control conditions. The same 16 teachers who began the project in the fall completed it in the spring. The directors of the two centers were informed that one center was going to be picked as the intervention center and one as the control site. The control center was given a list of the books used in the intervention sites and a stipend to purchase the books as well as additional titles. Order forms indicated that the control group ordered all but three of the same titles that were used in the intervention group. In addition, during classroom visits to the control sites, observers saw that the books were displayed and being used by the control teachers.

Description of the Intervention

The intervention model focused on training teachers in book reading and oral language strategies. Teachers were also provided with 22 prop boxes that included books, concrete objects that represented target words in the books, and lesson plans. The props and books were used as part of the book reading and oral language activities.

The book reading training module is based on the work of Whitehurst, Arnold, et al. (1994) and Wasik and Bond (2001). Teachers were trained in three components of the book reading module: (a) asking questions, (b) building vocabulary, and (c) making connections. In asking questions, teachers were trained to ask open-ended questions that would elicit more than a one-word response. This is based on the findings of Whitehurst et al. (1988) and Dickinson (2001), who determined that these questioning strategies were most effective in encouraging children to talk and in developing language skills. The vocabulary development and effort to make connections are based on work by Wasik and Bond, which demonstrated that teaching vocabulary words and extending the use of target words to other activities increased children's knowledge of the words.

In the book reading module, teachers were instructed to introduce the target vocabulary before reading the book. Teachers were trained to show the children an object that represented the vocabulary word and ask, "What is this?" or "What do you call this?" The teacher then said, "What can I do with the . . .?" or "Tell me what you know about this." Teachers also were trained to ask questions during book reading that promoted discussions, such as "Tell me more about what is happening on this page" and "What do you think will happen next?" Teachers were provided with examples of the open-ended questions. After reading the story, teachers were instructed to ask children reflection questions such as, "What part of the book did you like the best?" and "Tell me why you think the character did what she did." As the teachers implemented the intervention, they developed their own questions that encouraged children to talk about the book.

As noted earlier, each intervention teacher was given prop boxes that contained books and objects organized around a specific theme or topic commonly used in preschool classrooms, such as "welcome to school," "clothing," or "the seasons." Each box contained two age-appropriate trade books that were carefully selected so that they were related to the topic or theme and shared similar vocabulary words on the selected topic. Each box also contained concrete objects that represented the target vocabulary in the trade books. The target words represented common objects that were thought to be unfamiliar to the children in the study yet necessary for story comprehension. Materials also included a big book of pictures of the target vocabulary words. For example, the garden prop box contained two books, *The Carrot Seed* (Krauss, 1989) and *Jack's Garden* (Cole, 1995). The box also contained the following objects: seeds, a shovel, a rake, a small version of a garden hose, a watering can, insects, flowers, a stalk of corn, and a carrot. A book that contained pictures of the target vocabulary was included. In addition, teachers were given lesson plans with suggested art and center activities that were related to the specific topic or theme. Teachers were trained to use the target vocabulary during the related activities.

Teachers were instructed to read the trade book twice while they were working on a specific topic or theme. They were asked to introduce the props before reading the books and to label each prop for the children. After the initial introduction of the props, teachers were instructed to begin each book reading with the children labeling the props. If the children were unable to provide an accurate label, the teacher would provide it for them. This included a discussion of what the prop could be used for and how it was presented in the book. Teachers were also trained to talk about the target vocabulary during the extension activities.

The Head Start classrooms consisted of a teacher and an assistant with approximately 18–20 children per classroom. The book reading was conducted in a whole-group format. The center activities typically had 3–5 children in a group. A theme was implemented for approximately 2 weeks. Teachers in the intervention classrooms were instructed to read the book with theme-related vocabulary at least once each day during circle time.

The oral language training was based on the research of Dickinson and Smith (1994) and Snow (1983), which showed that teachers' discourse influences the development of children's language. The oral language training was designed to teach teachers how to use conversational strategies that promoted multiple opportunities to speak, to actively listen, and to use varying vocabulary. There are three components to the oral language development module: (a) practicing and promoting active listening, (b) modeling rich language, and (c) providing feedback. This training was designed to have teachers reflect on how they use language and how they allow children to use language.

During the active listening component, teachers were trained to listen to what children said by directing their attention to the children, to patiently wait for the child to speak, and to respond in a meaningful way. For

example, to the child who said, "I see a dog," the teacher did not respond with matter-of-fact comments such as "that's nice" or "good." Instead, the teacher was trained to acknowledge what the child said by saying, "Yes, you see a dog," and then ask specific questions or make comments that helped the child elaborate on what he or she said. Using the same example, the teacher might have said, "Yes, you see a big, black dog. What is the dog doing?" or "What do you want to tell me about the big, black dog that you see?" The teacher acknowledged what the child said and tried to extend the child's language about the concept about which the child was talking.

Simultaneously, the teacher taught the children how to engage in active listening. The children were taught to listen to others while they were talking, to raise a quiet hand if they wanted to speak, and to take turns in speaking. These routines allowed for children to have opportunities to talk, to listen to other children, and to know that they would be acknowledged in the conversation. Because the teacher was being trained to help expand children's language, these routines allowed for children to have more time to talk and to pay attention while others were talking.

In the modeling rich language component, teachers were trained to expand their use of vocabulary and to provide elaborate explanations and descriptions of common activities and events. A simple comment of "good job" was encouraged to become "I like the way you use the color blue to draw the sky." Similarly, "The glue is on the table" becomes "The glue is on the round table next to the scissors."

In the providing feedback component, teachers were trained in three explicit strategies promoting children's language. One strategy was using *informational talk*, an elaborated, rich description of the common classroom activities or events. An example of informational talk is the following: "You are putting the big rectangular block on the small square block." During center or group activities, the teacher described verbally what the children were doing as well as attaching vocabulary words to the activity. Another strategy was expanding on children's language. For example, if a child said, "I made a house," the teacher would respond with "Yes, you built a house with the 10 blocks," repeating or recasting what the child said using a more detailed explanation and vocabulary words. The third strategy was asking questions that encouraged the children to use more language. This strategy was similar to using open-ended questioning during book reading and extending it to other situations. Teachers were trained to use various questioning starters such as, "Tell me about it!" "I wonder how . . .?" "How did that happen?" and "What if . . .?" in their everyday conversations with children, thereby encouraging the use of vocabulary words and facilitating children's use of language.

Intervention Procedures

The intervention was conducted over a 9-month period, from the end of September to the beginning of June. The training schedule began with the oral language module and continued with the book reading module. A group training with all of the intervention teachers was conducted once a month for 2 hr. During that time, teachers were trained in the explicit oral language and book reading strategies. The training focused on explaining what the strategy was, why it was important to use, and how it could be adapted in the classroom. Within 1 week of the training, Mary Alice Bond and Annemarie Hindman modeled the strategy that was discussed during the group training in each teacher's classroom. The teachers were then given 2 weeks to practice the strategy. After this time, each teacher was observed demonstrating the strategy. After observations, teachers were provided with both written and oral feedback regarding their demonstration of the strategies. If necessary, the strategy was demonstrated again, and the teacher was given additional time to practice before being observed for a second time. This coaching model was used to ensure that the teacher understood how to master the strategy and was able to use it flexibly in various situations. Teachers were explicitly directed to continue to use all of the strategies even though the training on a specific strategy was complete. During observation, teachers' use of the current strategy, as well as others that they were trained in, was noted. On average, Head Start teachers received a minimum of 2 hr of direct coaching per month.

Assessment

Child assessment. All children were individually pretested during September and posttested during the end of May and beginning of June on the PPVT–III (Dunn & Dunn, 1997) and the EOWPVT–III (Brownell, 2000). In addition, all children were administered a measure of alphabet knowledge in which they were asked to identify the 26 letters of the alphabet. Alphabet knowledge was not a part of this intervention, but all teachers in both Head Start centers received training on alphabet instruction by their on-site education coordinators.

Teacher assessment. All teachers in the intervention and control classrooms were observed reading a book to their class in September (to collect baseline data) and again at the end of May–beginning of June (as a posttest measure). In addition, a running record of the teacher's talking and questioning strategies was recorded. The goal was to determine whether questioning strategies that promoted conversations with young children were used during book reading and whether the nature of the questioning changed because of the intervention. The data were coded to determine the types of questions that were asked during the book reading experience and to determine whether there was a change in questioning strategies over time. The data were coded into four general categories: (a) informational questions related to the book, (b) informational talk related to the book, which included teachers comments about the book, (c) managerial questions unrelated to the book and focused on children's behavior and attention to the story, such as "Are you listening to what I said?" and (d) managerial talk unrelated to the book, such as "Sit down" and "Pay attention." The questions were further categorized into open and closed questions. *Open-ended questions* are defined as questions that require more than a yes–no or a one-word response. For example, questions such as "Why did you like the book?" and "Tell me why the character was happy?" are open-ended questions. Questions such as "Did you like the book?" and "What color is the girl's dress?" were coded as closed questions because they required a simple, one-word response.

In addition, all teachers in the intervention group were observed while engaging with children in activities other than book reading both in September and again in May. The purpose of this observation was to determine the degree to which teachers were implementing conversation strategies in contexts other than book reading. The three conversation strategies that the teachers were trained on were active listening, providing feedback, and modeling rich language. These strategies were quantified in behavioral terms, and a checklist was developed that reflected the targeted behaviors. The target behaviors for the active listening component included the following: (a) teacher offered explicit praise to children for active listening, (b) teacher discussed the idea of active listening, (c) teacher used the flannel board to promote active listening, and (d) teacher provided opportunities for active listening to occur. For the providing feedback component, the target behaviors included the following: (a) teacher asked children to tell more about their ideas, (b) teacher expanded on children's language, (c) teacher described children's activities in detail, and (d) teacher provided opportunities for children to respond to feedback. For the modeling rich language component, the target behaviors were the following: (a) teacher encouraged children to describe the features and function of objects, (b) teacher encouraged the use of theme-related vocabulary, (c) teacher used open-ended questions, and (d) teacher encouraged children to speak in more than one-word responses. Teachers were observed for 30–40 min during activities other than book reading, and the target behaviors were noted as being observed or not observed.

Teacher data on each observation that was conducted after each of the six trainings and modeling sessions were also collected and scored. The six observations coincided with six areas of training; the three for oral language development (active listening, modeling rich language, and providing feedback) and the three for book reading (asking questions, building

vocabulary, and making connections.) Because each training session focused on different strategies, the protocol was different for each of the six observations. For example, for the active listening module, teachers were observed to see whether they demonstrated the behaviors and strategies in which they were trained. If the habits of active listening were observed, which included making eye contact, practicing patience, and providing children with meaningful responses, these behaviors were scored as being observed. After feedback was provided, teachers were observed to determine whether they elaborated on children's language (e.g., if the child said, "I like this toy," and the teacher responded, "You like this toy, which has a green wheel and little pink seats that turns around when you move it") or if they asked more opened-ended questions to elicit more conversations among the teacher and children. Behaviors specific to each training were included in each observation protocol. During observations, the trainers coded whether the target behavior was demonstrated by the teacher.

In addition to direct teacher observations, we developed a coding system to rate teachers' level of implementation of the intervention strategies. Level of project implementation was measured on a 3-point scale and scored on how well teachers engaged in three dimensions: (a) utilization of trained strategies, (b) material use as part of the lesson, and (c) integration of the theme throughout activities to facilitate the consistent use of vocabulary. The scale ranged from 0 (*not observed and not implemented*) to 1 (*observed inconsistently*) to 2 (*observed consistently*). The lowest score that a teacher could obtain was a 0 and the highest was a 6. In June, Mary Alice Bond and Annemarie Hindman spent a total of 8 hr in the classrooms over the course of 5 days to observe teachers' level of program implementation. Each person rated each classroom on the three dimensions of program implementation. Interrater reliability was calculated by dividing the number of observations that were in total agreement by the total number of observations (29/30), resulting in an interrater reliability score of 97%. Data were also collected on teachers to determine the relation between implementation and years of teaching experience and the highest educational degree attained related to implementation.

Results

Children's Language Measures

The means for the expressive language, receptive language, and alphabet knowledge measures are presented in Table 1.

For expressive language, a one-way analysis of covariance (ANCOVA) on posttest standardized scores of the EOWPVT–III, using pretest standardized scores as covariates, revealed a significant main effect for condition, $F(1, 197) = 18.08$, $p < .001$. As can be seen in Table 1, children in the intervention group had significantly larger vocabularies at the posttest than children in the control group, and there was a moderately strong effect size ($d = 0.44$) Given the fact that the Type I error has been argued to be increased in cases in which students are the unit of analysis and intact classrooms are randomly assigned to either treatment or control conditions (Blair, Higgins, Topping, & Mortimer, 1983), the data were reanalyzed using the suggested remedy for this potential problem, that is, using classrooms as the unit of analysis. Using the classroom as the unit of analysis, the main effect for condition was also significant in the follow-up ANCOVA, $F(1, 13) = 15.24$, $p < .01$ (here one loses two degrees of freedom from the total number of classrooms for each posttest mean, and one more for the covariate). Thus, because this follow-up analysis was also significant, it suggests that the significant difference in the initial analysis is not due to Type I error.

Table 1
Means, Standard Deviations, and Effect Sizes for Pretest and Posttest Measures

	Pretest		Posttest		
Measure and group	*M*	*SD*	*M*	*SD*	Effect size
Receptive language					
Intervention	82.02	12.66	92.73	10.25	
Control	81.48	11.86	84.47	11.23	0.73
Expressive language					
Intervention	79.76	11.33	86.08	11.94	
Control	79.46	12.20	80.64	12.32	0.44
Alphabet knowledge					
Intervention	6.44	8.75	13.23	9.36	
Control	6.83	8.67	16.27	8.78	−0.33

For receptive language, a one-way ANCOVA on posttest standardized scores on the PPVT–III, using pretest scores as covariates, also revealed a significant main effect of condition regardless of whether the student or classroom was the unit of analysis, $F(1, 189) = 33.28$, $p < .001$, and $F(1, 13) = 27.13$, $p < .01$, respectively. Once again, intervention children had significantly larger vocabularies than control children, and the effect size was even larger ($d = 0.73$).

Before it can be concluded that the intervention produced these effects, however, it is important to rule out alternative explanations. For example, it could be argued that the results for expressive and receptive language simply reflect either preexisting differences in the children (e.g., intervention children had more language skills prior to the intervention) or preexisting differences in the teachers (e.g., the intervention teachers were better teachers). To examine alternative possibilities, we conducted several additional analyses. In the first, we entered in scores from classroom observations that reflected the degree to which intervention teachers faithfully implemented the program as they were instructed (as described in the Method section). Scores ranged from 0–6. For receptive language (using classroom as the unit of analysis), the partial correlation between level of implementation scores and posttest PPVT–III scores (using pretest PPVT–III scores as the covariate) was .69 ($p < .04$). Thus, higher posttest scores corresponded to higher levels of implementation. For expressive language, the partial correlation was .16 (*ns*). At least in the case of receptive language, the findings are consistent with the claim that the intervention is related to the outcome and not some other factor, such as the possibility that the intervention teachers were more skilled as instructors.

In a related way, if the intervention teachers were simply better teachers than the control teachers, one would expect their students to perform better on an outcome measure that was not the main target of the intervention, namely, alphabet knowledge. A one-way ANCOVA on posttest alphabet scores, using pretest scores as the covariate, revealed a main effect of condition, $F(1, 184) = 7.59$, $p < .01$. This time, however, children in the control classrooms performed significantly better than children in the intervention classrooms (see Table 1 for the means and effect sizes). This finding further undermines the claim that intervention teachers were more skilled.

Further, an analysis of pretest scores for both receptive and expressive language revealed that children in the intervention classrooms had scores that were very similar to those of children in the control classrooms (Fs < 1; see Table 1 for the means).

Thus, children in the two conditions were not different in their language skills at the start of the intervention.

Finally, we considered the possibility that children's ages were somehow related to the outcome. Here, we conducted hierarchical regression analyses in which pretest scores were entered in the first step, children's ages in the fall were entered in the second step, and condition (intervention, control) was added on the final step. These analyses showed that whereas both the pretest scores and condition were significant predictors for both receptive and expressive language, age was not a significant predictor in either analysis. For expressive language, the *t*s for pretest scores and condition were 14.86 and 4.10 (ps $< .001$), respectively (total $R^2 = .56$). For receptive language, the *t*s were 7.31 and 5.86 (ps $< .001$), respectively (total $R^2 = .35$).

Collectively, the original and follow-up analyses provide strong evidence that Head Start teachers can be trained in ways that substantially increase vocabulary in children. The effects cannot be explained by appealing to explanations related to Type I error, preexisting differences in teacher skills, or children's age.

Observations of Book Reading Behavior

The data on the observations of book reading conducted during the fall (prior to the intervention) revealed no significant differences between intervention teachers and control teachers in the amount of informational open questions, closed questions, or teacher talk that occurred before, during, or after a book was read (see Table 2 for the means). This finding provides further evidence that the teachers were similar before the intervention. Neither the condition of main effect nor interactions involving the condition factor were significant.

After the intervention in the spring, however, there was a main effect for condition, $F(1, 14) = 6.19$, $p < .03$, with teachers in the intervention group talking more in general during book reading compared with teachers in the control group (when all categories are summed). More important, teachers in the intervention group asked more open-ended questions than did teachers in the control group (see totals in Table 2). An analysis of variance revealed no differences for intervention and control teachers in asking open-ended questions in the fall ($F < 1$). There was a significant difference in the spring, however, after the intervention, $F(1, 14) = 4.70$, $p < .05$. Also, within-condition paired *t* tests were conducted to examine changes over time in (a) the total amount of open-ended questions that were asked at any time (before, during, and after reading) and (b) all other questions asked at these times (closed questions and general questions). Whereas intervention teachers showed a significant increase in the amount of open-ended questions after the intervention, $t(9) = 3.02$, $p < .02$, control teachers did not show a significant change in the amount of open-ended questions, $t(5) = 0.26$, *ns*.

As found in the analysis of level of implementation, however, observations of book reading revealed that some teachers changed their behaviors more than others. In particular, whereas 7 of the 10 intervention teachers demonstrated a tripling in the amount of verbal exchanges they had with students, 3 demonstrated far less change in their style of book reading. In contrast, only 1 of the control teachers was observed to engage in substantially more

Table 2
Means and Standard Deviations for Teacher Book Reading Behaviors

	Fall classrooms				Spring classrooms			
	Intervention		Control		Intervention		Control	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Informational open questions								
Before reading	1.10	2.03	0.00	0.00	1.80	1.99	0.17	0.41
During reading	0.60	0.97	3.00	4.98	6.30	5.40	1.67	2.73
After reading	0.50	0.85	1.17	2.40	3.50	4.17	1.17	2.40
Total	2.20		4.17		11.60		3.01	
Informational closed questions								
Before reading	1.80	2.20	2.83	4.67	2.20	1.75	2.50	3.02
During reading	3.90	5.43	5.83	9.02	10.8	4.59	8.67	9.27
After reading	1.30	2.79	1.50	2.51	2.30	2.26	1.67	2.66
Total	7.00		10.16		15.30		12.84	
Informational talk								
Before reading	3.90	4.20	1.83	2.40	7.20	3.01	3.83	2.79
During reading	9.50	15.53	8.50	10.71	25.50	18.37	10.67	9.95
After reading	2.80	4.34	3.00	2.83	3.00	3.16	1.50	2.07
Managerial closed questions								
Before reading	0.10	0.32	0.00	0.00	0.20	0.63	0.00	0.00
During reading	0.40	1.27	0.00	0.00	0.20	0.63	0.17	0.41
After reading	0.10	0.32	0.00	0.00	0.20	0.63	0.00	0.00
Managerial talk								
Before reading	0.50	1.27	0.67	0.82	0.90	0.88	1.50	2.81
During reading	0.50	1.27	0.67	1.03	3.10	2.69	1.17	1.60
After reading	0.10	0.32	0.67	1.63	0.50	0.97	0.00	0.00

Note. Values are raw frequencies.

verbal exchanges during book reading in the spring. The rest showed stability in their style of book reading.

Correlational analyses showed that book reading behaviors in the spring for both the control and intervention groups showed modest associations with receptive and expressive scores. For example, the amount of open questions and talk was correlated .38 and .48, respectively, with receptive language scores. Whereas the former correlation was not significant ($p < .08$), the latter was significant ($p < .025$).

Observations of Conversational Strategies

Data on teachers' interactions with children indicated that they were implementing the conversation strategies in activities other than book reading. The observations indicated that 90% of all of the intervention teachers provided opportunities for active listening to occur and that the teachers used the flannel board to help promote this listening strategy. Seventy percent of all of the teachers (a) asked children to talk more about their ideas or about an object that the children were using, (b) provided feedback to the child by explicitly asking the child a follow-up question and encouraging more than a one-word response, (c) encouraged the children to describe the features and function of an object, and (d) asked open-ended questions. Teachers were somewhat less likely to encourage the use of theme-related vocabulary (60%) outside of book reading. Only 40% of the teachers offered explicit praise to the children for demonstrating active listening behaviors. These findings suggest that teachers were implementing the target behaviors in classroom activities other than book reading and were engaging children in conversations.

Finally, as a means of beginning to tease apart the possible effects of teacher behaviors during reading and outside of reading, we computed the partial correlations listed in Table 3. The data were based on the observations of the teachers after the training and modeling sessions. The correlations are based on teacher behaviors and posttest receptive and expressive language scores controlling for pretest scores. Several things are notable about the findings. First, a larger number of teacher behaviors were significant correlates of receptive language posttest scores than expressive language scores (i.e., 30% of the correlations between teacher behavior and children's receptive vocabulary outcomes were statistically significant compared with only 13% for teacher behavior–expressive language correlations). This finding mirrors the effect size values for receptive and expressive language shown in Table 1. Second, whereas receptive scores were correlated with teacher behaviors during reading and also outside of reading, expressive scores were only correlated with behaviors during reading. Third, whereas most of the correlations for receptive language pertained to teacher behaviors expressed either during or after reading (with the exception of three indices of modeling rich language before), the strongest correlations for expressive language were for predictive, reactive, and recalling–reinforcing questions asked before reading. Also notable was the lack of a significant correlation between props and children's language skills.

Discussion

The primary purpose of this study was to extend the existing literature on vocabulary development in young children in three ways. First, we used an experimental design as a means of ruling out alternative explanations of our results and those of other recent studies that used a similar methodology (e.g., Wasik & Bond, 2001). Much of the existing work is correlational. Second, we wanted to see whether it was possible to substantially increase vocabulary in disadvantaged children who attended Head Start centers. Third, we wanted to conduct an exploratory set of analyses to get a sense of which teacher behaviors seemed to be particularly related to the language outcomes in order to lay the groundwork for additional, experimental studies that target the identified behaviors. The results of our study support three important conclusions.

The first is that children from high-poverty homes can show significant increases in the size of their vocabularies if they have the appropriate opportunities to learn. Children in the intervention classrooms not only engaged in conversations but also expressed and elaborated on their ideas, feelings, and reactions to stories and activities. These opportunities to converse seemed to be the contexts within which children acquired new words. Given the fact that children from high-poverty homes have deficient vocabularies because of their having relatively infrequent communicative exchanges with their primary caregivers (Hart & Risley, 1995), it is important that these children have increased opportunities to express themselves at school. We argue that the time that children spend in preschool classrooms can be used to effectively implement methods that result in increased language and literacy skills. As noted earlier, children currently spend very little time in such conversations (Dickinson & Tabors, 2001). Our results suggest that interventions to increase the amount of talk can have positive effects on children's vocabularies.

In the fall, the raw receptive scores for both the intervention and the control children (29.32 and 30.68, respectively) were slightly below the national norms on the PPVT–III for 30-month-old children (i.e., 31). Children in the study, however, were on average 44 months old at the time. Their mean should have been closer to 50 to be comparable with the same-aged children in the national sample. After the intervention in the spring, children in the intervention group had a mean of 49.45, which is very close to the mean for the same-aged children in the national norms sample (55.5). Thus, the children in the intervention group improved considerably despite their economic disadvantage. The control children improved to a mean of 40, but this score corresponds to the score obtained by 3-year-olds in the national sample. Thus, they scored in the range for children who were 8 months younger.

Second, the exploratory findings suggest that the way teachers talk to children both during book reading and outside of book reading can affect children's language skills. The correlational data suggest that teachers' use of strategies such as providing feedback to children's language, asking descriptive questions, and using active listening strategies is positively related to children's outcome language measures. Also, the asking of predictive, reactive, and recall questions outside of book reading appears to be related to children's language development. The data also suggest that teachers' questioning before and after book reading may have more of an impact on children's language growth than during book reading, which is consistent with the finding from Dickinson and Smith (1994). Also it appears that teachers making connections between what occurred during book reading and other classroom center activities is positively related to children's language devel-

Table 3
Partial Correlations Between Intervention Teacher's Behaviors and Children's Language Skills

Strategy	Receptive language	Expressive language
Conversation strategies used outside of book reading		
Active listening		
Active listening behaviors	.31	.39
Uses materials	.25	−.05
Uses strategies	.52*	.44
Provided elaborated feedback		
Provides feedback	.65**	.15
Modeling rich language		
Uses complete sentences	.30	.49*
Open-ended questions	.25	−.07
Vocabulary-related questions	.44	.42
Descriptive questions	.61**	.25
Strategies used during book reading		
Questioning strategies before reading		
Reflective questions (before)	.42	.51*
Predictive questions (before)	.08	.77**
Descriptive questions (before)	−.10	.15
Reactive questions (before)	.03	.87**
Recalling and reinforcing questions (before)	−.36	.94**
Total interactive book reading questions (before)	−.01	.86**
Questioning strategies during reading		
Reflective questions (during)	−.12	−.05
Predictive questions (during)	.31	−.02
Descriptive questions (during)	.41	−.32
Reactive questions (during)	.22	.49*
Recalling and reinforcing questions (during)	.19	.27
Total interactive book reading questions (during)	−.01	.36
Questioning strategies after reading		
Reflective questions (after)	.76**	.13
Predictive questions (after)	.79**	.18
Descriptive questions (after)	.36	.29
Reactive questions (after)	.41	−.02
Recalling and reinforcing questions (after)	.37	−.09
Total interactive book reading (after)	.75**	.07
Modeling rich language before reading		
Building vocabulary (before)	.61**	−.03
Defining (before)	.72**	−.11
Recasting (before)	.68**	−.06
Demonstrating (before)	.29	.23
Pointing (before)	.11	.32
Using props (before)	.12	−.28
Modeling rich language during reading		
Building vocabulary (during)	.54*	.27
Defining (during)	.11	.32
Recasting (during)	.40	.08
Demonstrating (during)	.59**	.48*
Pointing (during)	.11	.32
Using props (during)	.31	−.18
Modeling rich language after reading		
Building vocabulary (after)	.68**	.60**
Defining (after)	.56*	.41
Recasting (after)	.73**	.10
Demonstrating (after)	.78**	.08
Pointing (after)	−.02	.65**
Using props (after)	.04	.37
Making connections		
Before	.32	−.08
During	.82**	.24
After	.92**	−.13

Note. $N = 10$ intervention teachers.
* $p < .10$. ** $p < .05$.

opment. Subsequent studies need to confirm whether these teacher behaviors are causally linked to outcomes using experimental designs that systematically manipulate these factors. Given the exploratory nature of the present study, definite conclusions about the role of teacher behavior cannot be drawn.

In subsequent studies, it may be necessary to rethink the role of using props. We found that using props did not appear to be significantly related to vocabulary development. However, teachers acting out (demonstrating) the meaning of a vocabulary word was related. Although these findings are preliminary and a more systematic study would need to be conducted to draw firm conclusions, this finding has potential implications for early childhood instruction. Using objects to provide children with a concrete representation is thought to promote children's learning. However, our findings seem to support recent claims by Bloom (2000) and Nelson and Shaw (2002) that children acquire many new words even when the objects corresponding to these words are not present. In other words, these authors argued that the ostensive view of word learning may be misleading or incorrect.

The third important finding is that Head Start teachers can be trained to implement strategies that have positive effects on children's language and literacy development. The teachers in this study participated in an intensive professional development intervention that emphasized both conceptual and procedural aspects of language and literacy development in young children. During training, teachers were not merely told what to do; rather, they were also given explanations as to why talking and reading to young children would be beneficial to children's language and literacy development. In addition, teachers had the opportunity to observe the behaviors that they were expected to demonstrate, to practice those strategies while being observed, and to receive feedback on their performance. Through this coaching model, teachers had ongoing opportunities to practice these target strategies and to conference with an expert trainer on what worked and what was less effective. This training contributed to creating a classroom environment that encouraged children to talk and use language. As a result, teachers demonstrated the use of conversational and book reading strategies.

The data also revealed several interesting findings related to teacher characteristics and child outcomes. Children showed more growth in vocabulary when their teachers faithfully implemented the book reading and conversation strategies. As our data showed, children in high-implementation classrooms performed better on the receptive language measure than children in low-implementation classrooms. After the training, 70% of the intervention teachers significantly changed the way they talked to and willingly listened to children during book reading, increasing their use of open-ended questions and providing opportunities for children to engage in conversations. However, 30% did not alter their behavior nearly as much. On the basis of the observational data of teachers, we found that teachers were also implementing the target behaviors in classroom activities other than book reading and were engaging children in conversations.

We considered the possibility that the tendency to change was linked to a teacher's level of education, but we found that Head Start teachers' level of project implementation was not affected by the amount of education or teaching experience. In the design of future studies, it will be important to consider the role that factors such as pedagogical beliefs and motivation play in the implementation of the intervention.

Currently, there is a major emphasis on teaching language and literacy to Head Start children. The 1998 reauthorization of Head Start clearly emphasized that teachers need to teach language and literacy concepts to their children. In addition, the National Reporting System, an assessment administered to all Head Start children beginning in the fall of 2003, includes a vocabulary assessment, further highlighting the emphasis that Head Start has placed on developing language and literacy in young children. The findings from this study have important implications for how Head Start teachers should be trained to effectively implement language and literacy interventions. The training implemented in this study was an intensive, ongoing process. This is in contrast to 1-day trainings or week-long workshops in which there can be minimal follow-up with teachers in their classrooms. In this study, trainers spent an average of 4 hr per month with each teacher in her classroom. This allowed the trainer to form a relationship with the teachers, making it easier to provide both positive and constructive feedback on teachers' behaviors. When attempting to change the way in which teachers verbally interact with children, one needs to invest considerable time in working closely with the teachers. Teachers need the opportunities to have the desired behaviors modeled and to have time to practice these behaviors. Without feedback on their behaviors, teachers could be implementing the strategies ineffectively but would not know this. Having trainers available to observe and provide feedback helped most teachers implement the strategies with fidelity.

In addition, training teachers in why they should be doing something is equally as important as showing them what they need to do. Having the conceptual knowledge about why conversation and book reading strategies are important influenced teachers to change their behaviors. In this intervention, teachers were trained to talk with children in ways that were different from the ways they were used to interacting. Before teachers will adopt a new approach, they need to have a clear understanding of children and why the strategies are effective.

There are challenges in trying to change the way teachers talk with children. Often the culture of Head Start classrooms specifically and preschool classrooms in general is to keep order and manage the classroom. Unfortunately, this goal is often translated into teachers communicating with children in ways that do not encourage children to talk. Instead, a premium is placed on children listening and following directions. In this study, teachers were initially reluctant to ask questions of children and allow them to talk. In general, teachers were concerned that the children would become unruly and that talking would lead to chaos. As the trainers modeled how children talking and children listening could result in children expressing their ideas and their willingness to listen to others while they spoke, teachers became increasingly more convinced that the strategies could be effective. In addition, teachers reflected on the ways they interacted with children and made conscious changes in the way they spoke with and engaged children. Again, providing teachers with the rationale for why talking was important facilitated teachers' willingness to try the strategies.

In sum, Head Start teachers can be trained to implement strategies that foster language and vocabulary development in young, disadvantaged children. Future studies should consider the extent to which other aspects of language besides vocabulary can be

increased (e.g., syntax, phonological processing). In addition, more work is needed to understand the factors that affect the degree to which Head Start teachers implement language-enhancing strategies in their classrooms. Finally, it will be important to identify the reasons for individual differences in the vocabulary growth rates of children even when all are exposed to the same high-quality preschool environment.

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