Evaluation of Curricular Approaches to Enhance Preschool Early Literacy Skills

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Two curricula designed to enhance the early literacy skills of 4-year-old preschool children were evaluated against a third, comparison condition. Thirty-five Head Start preschool classrooms were assigned randomly to incorporate one of two early literacy curricular approaches, Let’s Begin with the Letter People® or Waterford Early Reading Program® Level 1, into their current curriculum, the High/Scope® Educational Approach, or to use the High/Scope method alone. Results indicated that children in the literacy intervention classrooms demonstrated significantly stronger outcomes in the areas of emergent writing, book and print knowledge, and general reading readiness skills. Minority language status also played a significant role in outcome, regardless of intervention condition. Implications for early childhood literacy interventions, especially important for children of low-income families, are discussed.

School readiness is a complex phenomenon including a spectrum of skills and characteristics in health, social, emotional, motor, and intellectual development. Emergent literacy refers to the skills, knowledge, and attitudes that serve as developmental precursors to formal instruction in reading and writing (Whitehurst & Lonigan, 1998). The concept of emergent literacy implies a developmental continuum of oral language and early literacy skills, serving as a foundation for more formal instruction in reading, writing, and spelling once in elementary school. Several components of emergent literacy likely contribute to a child’s eventual reading ability, including alphabet knowledge, phonological awareness,
concepts of print, and oral language skills such as semantic, syntactic, and conceptual knowledge (National Early Literacy Panel, 2005; Whitehurst & Lonigan, 1998). Early difficulties in attaining these skills have been linked to short- and long-term reading problems (Baydar, Brooks-Gunn, & Furstenberg, 1993; Roth, Speece, Cooper, & de la Paz, 1996; Spira, Bracken, & Fischel, 2005; Storch & Whitehurst, 2002).

PRESCHOOL LITERACY

Why focus on the preschool period? A predominant reason is that the stakes are high. The relationship between the skills with which children enter school and their later academic performance is strikingly stable (Tramontana, Hooper, & Selzer, 1988). For instance, Stevenson and Newman (1986) found a correlation of .52 between the ability to name the letters of the alphabet as a child entered kindergarten and performance on the Gates-MacGinitie Test of Reading Comprehension in Grade 10. Baydar et al. (1993) found that preschool cognitive functioning was highly predictive of adult literacy even when the effects of family environment and maternal education were controlled.

According to the 1991 Carnegie Foundation report Ready to Learn, A Mandate for the Nation, 35% of children in the United States enter public school with such low levels of the skills and motivation needed for scholastic success that they are at substantial risk for early academic difficulties. This problem, which is usually placed under the rubric of “school readiness,” is strongly linked to family income. When schools are ranked by the median socioeconomic status of their students, SES correlates .68 with academic achievement (White, 1982). The 2005 National Assessment of Educational Progress documented substantial differences in the reading and writing ability of children as a function of the economic level of their parents. For example, among African-American and Hispanic students in the United States, two groups that experience disproportionate rates of poverty, the percentages of grade 4 students reading below the basic level are 58% and 54%, respectively, compared to 24% of Caucasian students (National Center for Educational Statistics, 2005). SES is also one of the strongest predictors of performance differences in children at the beginning of first grade (Entwisle & Alexander, cited in Alexander & Entwisle, 1988, p. 99).

CHILDREN FROM LOW-INCOME BACKGROUNDS

The relationship between SES and achievement is understandable in light of salient differences between low-income and higher-income families that have
been documented in the literature. For instance, Hart and Risley (2002) found that by age three, important discrepancies were apparent between children in professional and welfare families; the professional families engaged in dramatically more language interactions and had children with larger spoken vocabularies. Additionally, numerous studies have documented substantial differences in the pattern of book ownership and frequency of shared reading between lower- and higher-SES families (e.g., Adams, 1990; Anderson & Stokes, 1984; Feitelson & Goldstein, 1986; McCormick & Mason, 1986; Raz & Bryant, 1990; Teale, 1986). Regardless of the root cause, such experiential differences are clearly important in contributing to variations in children’s academic outcomes (Storch & Whitehurst, 2001) and point to the importance of adopting evidence-based approaches in the preschool period to facilitate optimal preparation for success in formal reading instruction for all children.

A recent report of the Head Start Family and Child Experiences Survey (FACES; Zill, Resnick, & McKey, 1999) indicated that while children in Head Start attend classrooms that are predominantly of good quality, these children have deficiencies in the domain of emergent literacy. Based on the FACES 2000 national sample, the average child entering Head Start as a 4-year-old could name four letters of the alphabet and could name only nine letters upon exit from Head Start as a 5-year-old (Administration on Children, Youth and Families [ACYF], 2003).

One might expect the initiation of formal reading instruction in elementary school to equalize the skill base across children. However, formal elementary reading instruction does not appear to produce unified outcomes and may actually lead to a further differentiation of good and poor readers in the early grades. Juel (1988) found that being a poor reader at the end of first grade offered an 88% chance of remaining a poor reader at the end of fourth grade. Good readers had seen an average of more than 18,000 words in running text in their school readers by the end of first grade, whereas poor readers averaged about half that. At the end of fourth grade, good readers had seen approximately 178,000 words and, once again, poor readers experienced about half that number. Additionally, Juel found that in third and fourth grade, frequency of reading at home diverged dramatically for poor versus average and good readers.

Children for whom English is a second language are also at risk for the successful acquisition of early literacy skills. Gaps between Spanish-speaking and English-speaking children are apparent early on. In a study by Zill, Collins, West, and Hausken (1995), half as many Hispanic as Caucasian English-speaking 3- to 5-year-old children could name most or all alphabet letters. Parent-child book reading, which has been shown to be important for the development of early language skills, also appears to occur less frequently in the homes of Spanish-speaking children (New England Research Center on Head Start Quality, 1998). This disparity in early literacy skills and experiences continues as
students get older. According to the most recent National Assessment of Education Progress (National Center for Educational Statistics, 2005), Hispanic students scored an average of 26 scale points lower than White students in reading in fourth grade, and an average of 24 points lower in eighth grade. In some urban school districts, such as the District of Columbia, the score gap was greater than 50 points.

Together, these findings indicate that school achievement may co-vary with family income, social class, and minority language status, and that difficulty in early academic skills can have long-lasting effects on a child’s educational and literacy development. Differences present at school entry appear stable from kindergarten through high school. Reading and writing are the foundations for academic achievement; however, children living in economic poverty are starting school at risk in terms of emergent literacy skills and resources.

EMERGENT LITERACY INTERVENTIONS

Research on reading and emergent literacy provides important indications that strong oral language, alphabet knowledge, and phonemic awareness are the skills children need to learn how to read. The same research, however, provides much less guidance on how children should develop these skills. For instance, most research demonstrating the effectiveness of training for phonemic awareness in beginning readers has involved some type of pull-out experience in which children are tutored intensively by staff who are part of a research team (as opposed to regular teachers). Additionally, outcomes are often assessed on measures such as the ability to sound out simple consonant-vowel-consonant nonsense words rather than actual reading (e.g., Ball & Blachman, 1988; Bradley & Bryant, 1985; Lundberg, Frost, & Petersen, 1988; Torgesen, Morgan, & Davis, 1992; Uhry & Shepherd, 1993). Such research has illuminated a number of important skills in the complex process of learning to read, but success of such interventions with kindergarten and school-age children does not necessarily mean that similar instruction will work in regular classrooms, that it will generalize to reading in context, or that it is appropriate for preschool settings.

Unfortunately, relatively few studies have identified interventions that provide evidence of reduced risk or substantive improvement in literacy outcomes with samples of children from low-income families. The literature on the developmental, psychological, and educational impact on the academic lives of children in poverty is heavily weighted towards descriptions of the correlate risks and outcomes of poverty, rather than methods of reducing these risks and optimizing development. Further, the emergent literacy and language curriculum content of interventions has varied enormously, with little systematic analysis of the effects of specific curricula or curricular components on child outcomes.
At the preschool level in particular, the prepared curriculum choices for emergent literacy are limited and few have been subjected to evaluation under methodologically rigorous conditions. Existing research suffers from a lack of appropriate controls, widely varied outcome measures and implementation periods, and a narrow view of emergent literacy outcomes. The two literacy curricular approaches reflected in this study differ on important dimensions that may impact efficacy. Yet a common theoretical basis underlay their selection, namely their strong support for instruction in skills considered to be the strongest predictors of later reading achievement, which include alphabet knowledge, concepts of print, phonological awareness, oral language, and writing (National Early Literacy Panel, 2006).

*Let’s Begin with the Letter People*® (*Let’s Begin; Abrams & Company, 2001*) is a comprehensive early literacy curriculum. It addresses a broad array of early language and literacy skills, as well as early math, art, music, science, social, and motor development. It emphasizes a motivational approach to learning through play-centered instruction in the classroom. Language, for example, is viewed as an oral experience in which children talk and listen, relate their experiences, use rhymes, and hear and relate stories, songs, and poems in an effort to develop phonological awareness in the context of communication skills.

*Let’s Begin* has been implemented across a wide array of classes in differing SES levels and in urban and suburban settings. *Let’s Begin* has been piloted in approximately 110 pre-K and Head Start classrooms, including approximately 2,000 students from 1997 through 1999. The current estimate of Head Start users is at least 234 agencies (personal communication, Richard Abrams, October 4, 2000). The newest iteration of the kindergarten curriculum has been tested in small scale comparison studies producing consistent gains in such areas as rhyming, retelling a story, initial sound identification, name writing, and capital and lower case letter identification (Lehr, Wertheim, & Johnson, 2002). There is a dearth of both rigorous research and research on preschool level outcomes, despite the clearly popular implementation of the curriculum in Head Start and its attention to the quality standards for the Head Start Act (as amended October 27, 1998), the Head Start Performance Standards (revised March 10, 1999), as well as the National Head Start Association’s 10-key recommendations for Head Start. A strong rationale for this curriculum’s candidacy in the current project is built on the following: the number of current Head Start users, the apparent comprehensiveness and interest value of curriculum content, availability of necessary curriculum support materials, staff training availability, and the attention to Head Start’s needs. Finally the lack of precise, rigorous, short- and long-term outcome data for an otherwise popular curriculum in broad pre-K and Head Start use makes a compelling argument for inclusion in this project.
Computer-based technology is another promising method for achieving a practical and effective curriculum for learning emergent literacy skills in preschool settings. There is now a growing literature demonstrating that preschoolers can interact successfully with computers both in terms of sustained interest and substantive gains in knowledge (Lepper & Gurtner, 1989). This research has included small-scale demonstrations of success in the acquisition of basic skills by children using computers in Head Start (Ainsa, 1989; Tallent, Lancy, & Lee, 1997). Well-designed software allows children to learn through active exploration and interaction, a primary criterion for developmentally appropriate practice at the preschool level.

Computer assisted options for instruction in emergent literacy are often focused exclusively on phonemic awareness and letter knowledge, addressing only a fraction of the skills considered the essential core for pre-K growth in emergent literacy. The narrow focus potentially makes computer software curricula a risky comparison with other classroom literacy curricula, but the one-to-one interaction and ability to embed a computer-based curriculum in a broader classroom curriculum are attractive features. For the current study, Waterford Early Reading Program® Level I was selected because it includes a wide range of early literacy skills (e.g., letter knowledge, concepts of print, vocabulary, and story structure) and is conducted across an academic year (Waterford; Waterford Institute, Inc., 2001). Waterford is an integrated learning system that offers daily one-to-one learning time for each child. The Waterford software provides individualized instruction, pacing lessons to the individual student’s accomplishments and errors. Teacher guides for each letter of the alphabet provide additional activities allowing teachers to reinforce or expand upon the core of basic skills taught interactively through the software. A history of Waterford’s development can be found in Paterson, Henry, O’Quin, Ceprano, and Blue (2003). The largest published study of Waterford to date (Paterson et al.) included seven kindergartens and one first grade classroom and found no effect for the program. However, follow-up commentary by T. White (2004) raised the possibility that a number of factors may have contributed to the lack of significant results in the Paterson et al. study. Moreover, follow-up comments by Labbo (2004) recommended that since integrated learning systems such as Waterford have enjoyed success in the classroom, it is important for research studies to consider the context in which such programs work most optimally. In addition, the preschool age group remains an area in need of rigorous evaluation.

In the current study, the Let’s Begin and Waterford curricula were overlaid upon, or incorporated into, the High/Scope® Educational Approach (High/Scope) in the intervention classrooms. The study’s comparison classrooms used High/Scope alone. The High/Scope Educational Approach provides a highly appropriate comparison condition because it is a frequently used preschool method. According to the recent FACES survey, approximately 20% of Head
Start teachers nationally use High/Scope, making it among the most popular approaches in effect in Head Start classrooms (ACYF, 2003). The High/Scope method refers to an educational system, combining theory and practice, with guidelines for the physical environment, structure, tone, and content of child and staff activities (Epstein, Schweinhart, & McAdoo, 1996). The curriculum emphasizes the development of cognitive and social competence. The approach to language and literacy readiness is reflected in goals about the ability to express thoughts, ideas, and feelings, to dramatize, to graphically represent experiences, to communicate with others, and to work with other children and adults in group planning and cooperative efforts (summarized from eight goals in High/Scope ReSource, 1986, and High/Scope Preschool Key Experiences, 2000). Current research is ongoing to augment the early literacy aspects of the curriculum (e.g., Schweinhart & Daniel-Echols, 2005), but the approach in use at the time of this study did not focus intensively on early literacy skills. High/Scope has enjoyed years of research scrutiny in projects tracking participants since the 1960s on academic and social outcomes (Schweinhart & Weikart, 1997). However, specific emergent literacy and reading outcomes are either lacking or difficult to translate into useful current evidence for comparative interpretations.

In sum, the Let’s Begin and Waterford literacy interventions, as well as the High/Scope method, are all currently used in preschool classrooms around the country. Although there are promising outcomes associated with each, an evidence-based decision on effectiveness is far from clear, because: (a) appropriate controls are lacking in some instances; (b) outcome measures and length of implementation differ; and (c) outcomes championing some aspect of developmental improvement might be found, but other important areas in emergent literacy or general development are left unmeasured.

The purpose of this study was to identify the effects of two different emergent literacy interventions for children in low-income families. Specifically, the goal was to compare each of two literacy interventions against a comparison condition without the added literacy focus, in randomly assigned preschool classrooms. The two intervention curricula selected were of interest because of their apparent quality, their current usage, and willingness of the developer/publisher/distributor to have the product participate in this research. Most importantly, however, they represented very different qualities on the continuum of delivery (strongly teacher-directed versus strongly one-to-one, computer-child focused) and comprehensiveness (an early literacy approach embedded in a broader preschool curriculum versus a focused, 15-minutes-a-day computer-based approach). Finally, the broader objective of the project was to provide Head Start and other pre-K educational settings with research-based evidence on curricular approaches that may substantially enhance early literacy and strengthen academic readiness for formal reading instruction in elementary school.
METHOD

Participants

The sample consisted of 507 children (mean age 4 years, 4 months at pretest, with 99% of children falling between 3 years 9 months and 5 years 0 months) who attended full-day preschool classrooms, five days a week, in Head Start centers in southeastern New York. All centers were part of one multicenter Head Start grantee. Children attended Head Start during one of three school-year cohorts, 2001–2002, 2002–2003, or 2003–2004. Participating children were 42% African-American or Black, 41% Hispanic, 8% multiracial, 7% White, and 2% other or not identified. Approximately 14% of the sample was identified as Spanish language-dominant at Head Start entry. Study retention rates of children from fall pretesting to spring post-testing were very high, averaging 95% across the three years.

Lead teachers in the 35 study classrooms averaged 11.35 total years teaching (range 2–30 years) and 6.36 years teaching preschool (range 0–16 years). The highest level of schooling attained by lead teachers was as follows: 21% earned a graduate degree, 15% completed some graduate or professional schooling beyond a bachelor’s degree, 35% earned a bachelor’s degree, 21% completed some college or an associate’s degree, and just fewer than 9% completed either high/school or a vocational/technical program.

Measures

Informed consent was obtained from parents/guardians for their children’s participation. Consent rates averaged greater than 95% in each participating classroom. Enrollment for study participation occurred from September through mid-October in each of the three study years. All participating children were administered the tests described below at the beginning (October/November) and end (May/June) of the Head Start academic year. Testing was conducted by Westat (a contract research corporation) assessors and trained laboratory staff. Child assessments were conducted individually over two 20–30 minute sessions and testing of all children was completed within a 4-week period.

Participating children were assessed for their readiness for learning to read with the Get Ready to Read! Screen (RTR; National Center for Learning Disabilities, 2000). This instrument focuses on three core domains of readiness for reading instruction: print knowledge (e.g., differentiating print from pictures, naming letters, identifying letter sounds), emergent writing skills (e.g., identifying best print exemplars), and linguistic awareness (e.g., rhyming, segmenting words, deletion of sounds). The RTR consists of 20 items, each involving an array of four response choices with the child required to respond by pointing
to their chosen answer. Cronbach alpha for the RTR is .78. According to the developers, scores of 0–6 represent very weak early literacy skills, 6–9 weak skills, 9–12 average skills, 12–16 strong skills, and 16–20 very strong skills (National Center for Learning Disabilities, 2004).

Children were also assessed on two subtests of the Woodcock Johnson-Revised: Tests of Achievement (WJ-R; Woodcock & Johnson, 1989), Letter-Word Identification and Dictation. Letter-Word Identification is a task that involves, in the initial items, symbolic learning, or the ability to match a rebus with an actual picture of the object. Later items include identifying isolated letters and then words. The Dictation subtest assesses prewriting skills such as drawing lines and copying letters, with later items including writing letters and phrases, punctuation, and capitalization. Internal consistency reliability coefficients are .92 for both Letter-Word Identification and Dictation.

Letter knowledge was assessed using a letter naming task developed for FACES (ACYF, 2003) and for use in the Head Start Quality Research Center projects. Children are shown all 26 upper-case letters of the alphabet, divided into three groups of 8, 9, and 9 letters, arranged in approximate order of difficulty. The child is asked to identify as many letters as possible (i.e., “Here are some letters of the alphabet. Point to all the letters that you know and tell me the name of each one.”). The second part of this task is a recognition task, in which the child is asked to find the letters that were not identified by name (i.e., if a child did not identify the letter “B” by name, he or she would later be asked “Can you find the letter ‘B’?”). For the purpose of data scoring, a child was given 1 point for each letter named and 1 point for each additional letter recognized, resulting in a possible total of 26 Letters Known.

The Peabody Picture Vocabulary Test–III (PPVT–III; Dunn & Dunn, 1997) was used to assess receptive vocabulary skills. Each child was presented with an array of four pictures and was instructed to point to the target that most closely reflected a word said aloud by the assessor. Internal consistency reliability coefficient for the PPVT–III is .95.

Finally, children’s story and print concepts were assessed using another measure developed for FACES (ACYF, 2003) and for use in each of the Head Start Quality Research Center projects. This measure was an adaptation of earlier pre-reading assessments developed by Clay (1979), Teale (1988, 1990), and Mason and Stewart (1989). In these procedures, a child is handed a children’s storybook, Where’s My Teddy (Alborough, 1992), upside down and backwards. The assessor asks the child a series of questions designed to test the child’s knowledge of books. The questions comprise three measures: Book Knowledge (e.g., front of the book, opening the book, where one begins to read, and information related to the title and author of the book), Print Conventions (e.g., questions about the left-to-right and up-and-down conventions of reading), and Comprehension (e.g., questions about the character’s feelings and plot). FACES internal
consistency reliability for these measures is .58 for Book Knowledge, .74 for Print Conventions, and .42 for Comprehension.

Pretesting included assessment of the child’s primary language to determine the most appropriate language for test administration. Assessment was based upon information provided by the child’s teacher and assessor, as well as the Pre-Language Assessment Scales (PreLAS; Duncan & DeAvila, 2000). At pretest, children identified as Spanish-dominant were administered Spanish-language versions of the PPVT and Woodcock-Johnson Letter-Word Identification and Dictation subtests, as well as the English-language versions of the PPVT and Woodcock-Johnson Letter-Word Identification. For all other measures (i.e., Get Ready to Read! Screen, Letters Known, Book Knowledge, Print Conventions, and Comprehension), the English-language version was followed, substituting verbal instructions in Spanish. The children’s book used for the Book Knowledge, Print Conventions, and Comprehension measures was translated into Spanish as well.

At post test, all children were administered all measures in English regardless of initial language status. The analyses reported in this paper focus exclusively on the English-language versions of the measures. Thus, Spanish-dominant children were excluded from analyses involving Dictation, as they did not receive the English-language version of this measure at pretest.

Interventions

Thirty-five classrooms within six Head Start centers were assigned randomly to one of the two literacy interventions or to the comparison condition. This included 9 classrooms in year 1 (3 Let’s Begin, 3 Waterford, 3 Comparison), 15 classrooms in year 2 (5 Let’s Begin, 5 Waterford, 5 Comparison), and 11 classrooms in year 3 (4 Let’s Begin, 4 Waterford, and 3 Comparison). More importantly, the research design included provisions for both expansion and replication in years 2 and 3 of the study. That is, the project was extended to include new centers, beginning with 4 centers in year 1, an addition of a new, fifth center in year 2, and a new, sixth center in year 3. In addition, the research design disallowed nesting of a condition in solely one center to prevent possible differences between centers from confounding the results; therefore, each center included a minimum of two different conditions.

Moreover, years 2 and 3 of the study included a mix of both repeating, or “experienced,” intervention teachers (those teachers who already participated in one of the two intervention conditions the previous year) and “new” intervention teachers (those teachers who had not yet participated in an intervention condition). Repeat teachers were drawn randomly from the pool of participating intervention teachers the prior year. Repeat teachers were required to stay within their condition; that is, a Let’s Begin teacher randomly selected to participate
TABLE 1
Three-Year Research Design-Pattern of New and Repeat Teachers

<table>
<thead>
<tr>
<th>Condition</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total by Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let’s Begin</td>
<td>3 new</td>
<td>2 repeat</td>
<td>2 repeat</td>
<td>12 classrooms</td>
</tr>
<tr>
<td></td>
<td>3 new</td>
<td>2 new</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterford</td>
<td>3 new</td>
<td>2 repeat</td>
<td>2 repeat</td>
<td>12 classrooms</td>
</tr>
<tr>
<td></td>
<td>3 new</td>
<td>2 new</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>3 new</td>
<td>5 new</td>
<td>3 new</td>
<td>11 classrooms</td>
</tr>
<tr>
<td>Total by</td>
<td>9 classrooms</td>
<td>15 classrooms</td>
<td>11 classrooms</td>
<td>35 classrooms</td>
</tr>
</tbody>
</table>

again did so in the Let’s Begin condition; a Waterford teacher could only participate in the Waterford condition. Note that comparison teachers were always new participants in the study, though each comparison teacher had been using the comparison curriculum, High/Scope, for at least one year prior to their participation in this study. This allowed for a wait-list control model, in which comparison teachers for any one year were offered entry into an intervention condition the following year. However, opting into intervention required random assignment to Let’s Begin or Waterford. The breakdown of experienced and new teachers by study year and condition is described in Table 1.

Laboratory staff monitored curriculum implementation with periodic visits to all participating classrooms. Each intervention curriculum also included its own specific checks on implementation and fidelity, which are described below.

Comparison Condition

The Head Start grantee in the present study had been using the High/Scope Educational Approach for at least a decade prior to the beginning of this study. As a result, this approach served as an appropriate comparison condition for those classrooms not assigned to an intervention. Considerable staff training is employed to support the High/Scope model, both through curriculum training at a week-long in-service session at the start of the year and through educational and child development specialist support in the classroom throughout the school year.

The High/Scope curriculum prescribes a daily routine including planning time, work time, cleanup time, recall time, large-group time, small-group time, and outside time. There is core emphasis on a “plan-do-review sequence” considered to promote competency in social domains of developing initiative, self-confidence, and a sense of community in which adults and children form nurturing partnerships by contextualizing learning and development in a warm and
caring atmosphere. Further, the recall aspects of the “plan-do-review sequence” are intended to support use of words, actions, and symbols in sharing recall of activities with others. The High/Scope Educational System incorporates individual child assessment as part of the curriculum, offering teachers the tools to organize and track each child through the High/Scope Child Observation Record for Ages 2½–6 (High/Scope Educational Research Foundation, 1992).

High/Scope has focused a great deal of effort on training and implementation of a preschool curriculum compatible with the goals of the performance standards for Head Start (Epstein, 1998). More specifically, in response to the revised performance standards (related to skill development in language, promoting interaction and language use among children and between children and adults, and supporting age-appropriate school readiness skills, including emergent literacy, numeracy, reasoning, problem-solving, and decision-making), the High/Scope curriculum is considered to have a path to these goals through the nature of the adult-child interaction in the classroom, development of trust, adults as play partners, and shared control of conversation with rich open-ended questions used throughout the day. Appropriate play materials and activities, including books, are within the child’s reach in appropriately structured classroom spaces (Epstein, 1998).

**Let’s Begin with the Letter People®**

*Let’s Begin* addresses a broad array of early language and literacy skills, as well as numeracy, art, music, science, social, and motor development. It emphasizes a motivational approach to learning through play, centered in the classroom but with a home/parent component as well. The *Let’s Begin* curriculum is arranged around five themes: (1) All About Me; (2) Animals, Animals, Animals; (3) Everyone Has Needs; (4) Getting Along with Others; and (5) Nature All Around Us, which address the seven key domains of (1) oral language/listening, (2) alphabetic/story knowledge, (3) science/math, (4) personal/social development, (5) large/small motor skills, (6) art/music, and (7) reach the home. Within each theme are several units with lessons tightly associated with a particular Letter Person, such as Mr. N or Ms. P, using the Letter People to introduce specific letters, sounds, stories, colors/shapes, and characteristics. Audio and visual props augment the learning experience, including the inflatable Letter People Huggables, Letter People songs, and Big and Little Books. Upon introduction of a new Letter Person, Mr. N, for example, the opening meeting circle of the day would include introduction of Mr. N, review of the colors he wears, explanation of his enjoyment of noodles, and the fact that he has a noisy nose, along with a song featuring Mr. N, and using a shower of N-sound words. Other activities focus on Mr. N’s love of noise, counting same or different types of noodles, and engaging in activities in the various interest centers of the classroom that
include N, such as cutting out noses in magazine for a nose collage, playing with noisemakers, and creating a noisy parade.

Let’s Begin includes floor plan recommendations for the classrooms’ activity centers, daily activity plans utilizing the meeting circle, interest centers, and opportunities for repetition of previous activities. Each unit of the curriculum extends out to the family through take-home activities in English and Spanish. Care is taken to suggest ways to adapt activities when English is not the native language of the child. The curriculum incorporates evaluation in the form of a pre/post checklist focused primarily on language, listening, phonological awareness, alphabet knowledge, and story knowledge. For performance assessment, there is an ongoing teacher observational assessment, as well as a rating scale which is coupled with the child’s work in a portfolio for teacher and family review.

Teacher and teacher assistant training in the Let’s Begin curriculum was conducted over a 3-day period in August of each intervention year by a professional trainer from Abrams and Company. Follow-up training visits were held in the fall and spring of each intervention year, in which the Let’s Begin trainer visited each classroom in the Let’s Begin condition. During these visits, the trainer completed classroom fidelity forms (described below) and provided individual feedback and additional support to each teacher. The trainer held a group meeting for all teachers and teacher assistants in the condition for further curriculum training.

This literacy intervention was overlaid on the preexisting High/Scope method already in use in the intervention classrooms. That is, teachers incorporated the activities, lessons, and materials from Let’s Begin into their regular daily routines, while continuing to follow the High/Scope Approach. Let’s Begin directly supports the following High/Scope Key Experiences by providing age-appropriate materials and activity ideas: Creative Representation, Language and Literacy, Initiative and Social Relations, Movement, Music, Classification, Serration, Number, Space, and Time. For example, Let’s Begin supports the High/Scope Key Experience of Language and Literacy through the Letter People Huggables, which stimulate oral interaction, and through activities such as stories, poems, fingerplays, rhymes, and songs to increase phonological awareness, build print awareness, and increase children’s vocabularies.

Waterford Early Reading Program® Level 1

Waterford is an emergent literacy approach that utilizes computer-based technology. It begins with a tutorial to familiarize the child with the computer and mouse, followed by a pretest to assess baseline knowledge of the 26 capital letters. The computerized instruction, which was set at 15 minutes per day, per child, is supported by a variety of scored and unscored activities focused on
developing phonological and phonemic awareness, letter recognition skills, and knowledge of story and print concepts, along with a variety of general readiness activities. Activities aimed at improving phonological and phonemic awareness include rhyming, making rhyme stories, exploring initial sounds in words, blending, and learning the sounds of the letters. Activities aimed at increasing letter recognition skills include learning the letter names and shapes, identifying written letters in the context of familiar words, and exploring words that begin with a certain letter. Story and print concepts are addressed through activities focusing on learning directionality of text, connecting text with pictures, connecting written and spoken text, and making creative predictions. Finally, general readiness activities include concepts such as over/under, parts of the body, opposites, colors, numbers 1–5, sequencing, basic shapes, and sorting by category.

The Waterford instructional sequence is centered on each of the capital letters followed by lowercase; each letter is associated with activities addressing the domains of phonological and phonemic awareness, letter knowledge, story and print concepts, and a specific readiness skill. After every five letters, students are provided with the opportunity to review recently learned letters. Children scoring poorly in the Alphabet Review segment receive additional instruction on letters needing improvement. Periodically throughout the year, children spend time in Play and Practice, in which the child is allowed to choose different review activities in an exploratory environment.

The computer program provides information on each participating child regarding the number of sessions completed, amount of time spent on the computer, and overall performance on the scored literacy activities. Teachers used this information on a weekly basis to monitor each child’s progress, as well as the progress of the entire class; in addition, teachers were able to assign additional activities at the end of many lessons to provide extra practice. Waterford also contains several take-home materials designed to support the classroom curriculum. Developmentally appropriate books with text that supports sight word and vocabulary development, as well as videotapes that focus on letter names, nursery rhymes, and songs that were first introduced in class, were sent home with each child throughout the year.

Curriculum training for all participating teachers and teacher assistants for the Waterford Early Reading Program Level 1 occurred in a one-day training session each August, led by a professional trainer from Pearson Digital Learning. Each teacher had the opportunity to operate the computer and manipulate the program under the supervision of the trainer, and learned ways to incorporate the support materials (e.g., videotapes and books) into the curriculum. In addition, a mid-year visit was conducted by the trainer to each Waterford classroom. The trainer reviewed class progress with the teacher, using summary data maintained by the program, and provided support, feedback, and additional training. Similar
to the *Let’s Begin* condition, ongoing professional consultation and technology support was offered to all classrooms in the *Waterford* condition on an as needed basis.

Similar to the *Let’s Begin* intervention classrooms, this computer-based curriculum was overlaid upon the existing High/Scope framework in place in the *Waterford* intervention classrooms. Children rotated through their 15-minutes-per-day computer time two at a time (each intervention classroom had two computers). The related *Waterford* books and videos were incorporated into small- and large-group time within the High/Scope framework.

### Fidelity

Fidelity of *Waterford* implementation was assessed through evaluation of the computer records of each student’s total time. Average number of hours across the 12 *Waterford* classrooms was 29 hours (rounded to the nearest whole-hour; SD = 3 hrs), which translates to approximately 116 15-minute sessions per student. As a point of reference, the maximum number of sessions a child may have completed, taking into account the start and end date of the literacy intervention, is approximately 150 sessions. This represents the possible number of sessions for a child who was present every day of the school year. However, in addition to personal absences, children’s usage of the computer program was also affected by classroom field trips, holiday parties, parent-teacher conferences, and unexpected school closings related to weather. Importantly, no single classroom differed significantly from the overall group mean of 29 hours ($t[11] = -0.33$, ns), demonstrating consistency between classrooms. Moreover, the three cohorts did not differ significantly from one another, $F(2, 9) = 2.54$, ns.

The professional trainer visited each *Let’s Begin* classroom twice during the school year. During the classroom visit, the trainer used a checklist to assess each teacher’s degree of implementation in two key domains: Classroom Organization (including room arrangement, classroom environment, center materials, center activities, number and variety of book in the classroom library, and placement and accessibility of the *Let’s Begin Huggables*); and Teacher Behavior (including observation of a *Let’s Begin* lesson, use of the meeting circle, use of listening centers, level of child/teacher interaction, use of assessment tools, and evaluation of teacher lesson plans). Evaluation of these fidelity checklists shows that all *Let’s Begin* teachers across the three study years implemented the curriculum accurately and appropriately.

Fidelity of implementation of the High/Scope Approach was conducted by center managers and child development specialists during their regular visits to each classroom, as well as through regular staff meetings.
RESULTS

Descriptive Statistics

Table 2 shows the means and standard deviations for all child assessments at pretest and posttest by condition. Standard scores are reported when available; in a few cases, raw scores are reported. The pretest standardized means of the sample on the PPVT, Dictation, and Letter-Word Identification measures were all below the national average, suggesting that the overall performance of the sample was lower than that of the national standardization sample. However, the standard deviation of the sample on each of these measures was comparable to that of the national standardization sample, suggesting that the range of performance in our sample was normal and unrestricted.

Statistical Analyses

Pretest analyses. A MANOVA performed on the eight literacy variables at pretest revealed no significant differences in performance on the literacy measures between children in the three conditions prior to the implementation of the literacy interventions, Wilk’s lambda = .94, ns.

In addition, the number of children characterized as predominantly Spanish-speaking in each condition was investigated. Conditions did not differ with regard to the percentage of children designated as Spanish-dominant in the Fall, $F(2, 486) = .01$, ns.

Evaluation of teacher credentials revealed no significant differences among lead teachers in the three conditions in the total number of years teaching, $F(2, 31) = .08$, ns, the number of years teaching preschool, $F(2, 30) = .27$, ns, or the highest level of education attained, $F(2, 31) = 2.22$, ns.

Outcome analyses. To assess the overall effects of the two emergent literacy interventions on outcome scores, separate mixed-effects ANCOVA models were conducted comparing each intervention condition to the comparison condition on the eight literacy outcome measures. The mixed-effects model method of analysis was selected in response to our hierarchically nested quasi-experimental design, which included the potentially random effect of a child’s assignment to a particular classroom. Mixed-effects ANCOVAs were performed with condition as a fixed independent variable, classroom as a random independent variable, child pretest performance as a covariate, and posttest performance as the dependent variable. Satterthwaite’s method of denominator synthesis (Satterthwaite, 1946) was used to determine appropriate error terms. Results of the mixed-effects ANCOVAs are presented in Table 3 (condition effects) and Table 4 (classroom effects).
<table>
<thead>
<tr>
<th>Measure</th>
<th>Let's Begin (n = 185)</th>
<th>Waterford (n = 172)</th>
<th>Comparison (n = 150)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Get Ready to Read! Screen*</td>
<td>8.37 (3.18)</td>
<td>13.08 (3.69)</td>
<td>8.02 (3.15)</td>
</tr>
<tr>
<td>Peabody Picture Vocabulary Test</td>
<td>85.16 (14.92)</td>
<td>88.54 (13.79)</td>
<td>81.71 (14.52)</td>
</tr>
<tr>
<td>Letters Known*</td>
<td>6.49 (7.73)</td>
<td>19.29 (8.52)</td>
<td>6.39 (7.41)</td>
</tr>
<tr>
<td>Letter-Word Identification (WJ)</td>
<td>93.73 (8.76)</td>
<td>100.98 (11.72)</td>
<td>94.02 (9.07)</td>
</tr>
<tr>
<td>Dictation (WJ)</td>
<td>84.84 (11.72)</td>
<td>93.11 (14.80)</td>
<td>87.26 (10.37)</td>
</tr>
<tr>
<td>Book Knowledge*</td>
<td>2.00 (1.23)</td>
<td>2.98 (1.36)</td>
<td>1.64 (1.16)</td>
</tr>
<tr>
<td>Print Conventions*</td>
<td>0.26 (0.65)</td>
<td>0.52 (0.79)</td>
<td>0.25 (0.57)</td>
</tr>
<tr>
<td>Comprehension*</td>
<td>0.60 (0.72)</td>
<td>0.88 (0.75)</td>
<td>0.58 (0.68)</td>
</tr>
</tbody>
</table>

*Note. Standard scores are presented when available; for all other assessments (denoted with an asterisk), raw scores are presented. Ranges for raw scores are as follows: Get Ready to Read! Screen (0–20), Letters Known (0–26), Book Knowledge (0–5), Print Conventions (0–2), Comprehension (0–2).
Let's Begin with the Letter People. The mixed-effects ANCOVA analyses resulted in significant intervention effects for the Get Ready to Read! Screen, Woodcock-Johnson Dictation, Book Knowledge, and Print Conventions. Differences in Letters Known approached significance. Significant classroom effects were observed for the Get Ready to Read! Screen, PPVT, Letters Known, Woodcock-Johnson Letter-Word ID, Print Conventions, and Comprehension.

**Waterford Early Reading Program Level I.** The mixed-effects ANCOVA analyses resulted in significant intervention effects for the Get Ready to Read! Screen and Print Conventions. Significant classroom effects were observed for the PPVT, Letters Known, Woodcock-Johnson Letter-Word ID, and Print Conventions.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Analysis</th>
<th>Intervention Effect (F, p)</th>
<th>Effect Size (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Ready to Read! Screen</td>
<td>LP &gt; Comparison</td>
<td>$F(1, 20.21) = 8.21, p = .01$</td>
<td>$d = .35$</td>
</tr>
<tr>
<td></td>
<td>W &gt; Comparison</td>
<td>$F(1, 19.69) = 8.37, p = .01$</td>
<td>$d = .24$</td>
</tr>
<tr>
<td>Peabody Picture Vocabulary Test</td>
<td>LP vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Letters Known</td>
<td>LP &gt; Comparison</td>
<td>$F(1, 20.63) = 3.91, p = .06$</td>
<td>$d = .39$</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Letter-Word Identification (WJ)</td>
<td>LP vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Dictation (WJ)</td>
<td>LP &gt; Comparison</td>
<td>$F(1, 18.03) = 8.03, p = .01$</td>
<td>$d = .36$</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Book Knowledge</td>
<td>LP &gt; Comparison</td>
<td>$F(1, 20.32) = 4.93, p = .04$</td>
<td>$d = .38$</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Print Conventions</td>
<td>LP &gt; Comparison</td>
<td>$F(1, 20.43) = 4.93, p = .04$</td>
<td>$d = .37$</td>
</tr>
<tr>
<td></td>
<td>W &gt; Comparison</td>
<td>$F(1, 20.38) = 4.18, p = .05$</td>
<td>$d = .37$</td>
</tr>
<tr>
<td>Comprehension</td>
<td>LP vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Note.** LP = Let's Begin condition; W = Waterford condition; WJ = Woodcock-Johnson-Revised. “Greater than” (>) signs are used to denote the direction of significant effects.
### TABLE 4
Mixed-Effects ANCOVAs: Classroom Effects (Random) on Child Literacy Outcomes

<table>
<thead>
<tr>
<th>Measure</th>
<th>Analysis</th>
<th>Classroom Effect (F, p)</th>
<th>% of Total Variance¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get Ready to Read! Screen</td>
<td>LP vs. Comparison</td>
<td>F(21, 311) = 2.06, p = .00</td>
<td>6.8%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Peabody Picture Vocabulary Test</td>
<td>LP vs. Comparison</td>
<td>F(21, 305) = 2.35, p = .00</td>
<td>8.7%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>F(21, 290) = 2.05, p = .00</td>
<td>7.2%</td>
</tr>
<tr>
<td>Letters Known</td>
<td>LP vs. Comparison</td>
<td>F(21, 310) = 4.36, p = .00</td>
<td>18.9%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>F(21, 298) = 4.22, p = .00</td>
<td>18.8%</td>
</tr>
<tr>
<td>Letter-Word Identification (WJ)</td>
<td>LP vs. Comparison</td>
<td>F(21, 260) = 4.75, p = .00</td>
<td>23.5%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>F(21, 252) = 4.17, p = .00</td>
<td>21.0%</td>
</tr>
<tr>
<td>Dictation (WJ)</td>
<td>LP vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Book Knowledge</td>
<td>LP vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Print Conventions</td>
<td>LP vs. Comparison</td>
<td>F(21, 310) = 2.34, p = .00</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>F(21, 298) = 2.73, p = .00</td>
<td>11.1%</td>
</tr>
<tr>
<td>Comprehension</td>
<td>LP vs. Comparison</td>
<td>F(21, 310) = 1.69, p = .03</td>
<td>4.6%</td>
</tr>
<tr>
<td></td>
<td>W vs. Comparison</td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

Note. LP = Let’s Begin condition; W = Waterford condition; WJ = Woodcock-Johnson-Revised

¹Reflects the percentage of total variance in each literacy measure accounted for by classroom factors in each analysis.

**Effect sizes.** Effect sizes (Cohen’s d, using pooled standard deviation; Cohen, 1988), were calculated for all significant intervention results, using unadjusted posttest means. These are presented in Table 3, alongside the mixed-effects ANCOVA intervention results. According to Cohen’s definitions, the effect sizes fall within the small range.

**Variance components.** Variance component estimations, that is, the estimated co-variation between classroom factors and literacy outcomes in the mixed-model ANCOVAs, were calculated for all cases in which the random effect of classroom was significant. Intraclass correlation coefficients were then
computed as the ratio of the estimated variance component of classroom on outcome to the sum of the classroom and error variance components on that outcome. The intraclass correlation coefficients indicate the amount of variation in a literacy outcome measure accounted for by classroom factors. In other words, to what degree, if any, did classroom context, which may include such factors as the teacher, classroom environment, and unique composition of students, play a role in the differences in classroom averages on the various literacy measures? The intraclass correlation coefficients, presented as percentages of variance accounted for, are presented in Table 4 along with classroom effects results.

Effects of Experienced Teachers

As stated previously, the intervention conditions in cohorts 2 and 3 involved a combination of repeating teachers, that is, those teachers who had already participated for at least one year in an intervention condition (subsequently referred to as “experienced” teachers), and new teachers, that is, those teachers who had not yet participated in one of the intervention curricula (referred to as “new” teachers). The effect of having an experienced intervention teacher was tested in several ways. Classroom averages on each literacy measure were calculated to aid in the classroom-level analyses discussed below.

First, intervention versus comparison classroom-level ANCOVAs were run excluding classrooms whose teachers were participating in their second or third intervention year. Thus, using only new teachers the following findings were apparent: Let’s Begin intervention effects were significant for the Get Ready to Read! Screen, $F(1, 16) = 4.55$, $p = .05$, and the Woodcock-Johnson Dictation, $F(1, 16) = 7.06$, $p = .02$. Let’s Begin intervention effects on Book Knowledge approached significance, $F(1, 16) = 3.74$, $p = .07$. Intervention effects on Print Conventions did not approach significance ($p = .25$). Waterford intervention effects were significant for the Get Ready to Read! Screen, $F(1, 16) = 7.03$, $p = .02$. Intervention effects on Print Conventions did not approach significance ($p = .15$).

Second, intervention versus comparison classroom-level ANCOVAs were run including only those intervention teachers who were experienced in their intervention; that is, they were implementing the intervention in their classroom for a second or third time. In this case, Let’s Begin intervention effects were significant for the Get Ready to Read! Screen, $F(1, 12) = 6.62$, $p = .02$, and Woodcock-Johnson Dictation, $F(1, 12) = 9.95$, $p = .01$. Differences in Print Conventions approached significance, $F(1, 12) = 3.86$, $p = .07$, although intervention effects on Book Knowledge did not, $F(1, 12) = 2.53$, $p = .14$. However, two new significant intervention effects emerged for the Let’s Begin condition, Letters Known, $F(1, 12) = 5.26$, $p = .04$, and Woodcock-Johnson
Letter-Word Identification, $F(1, 12) = 7.33, p = .02$. For the Waterford intervention, differences approached significance on the Get Ready to Read! Screen, $F(1, 12) = 4.24, p = .06$, and Print Conventions, $F(1, 12) = 4.51, p = .06$.

Finally, comparison of new versus experienced teachers within each intervention condition was conducted via classroom-level ANCOVA. Within the Let’s Begin condition, classrooms led by experienced teachers outperformed those led by new teachers on Letters Known, $F(1, 9) = 9.77, p = .01$, and Woodcock-Johnson Letter-Word Identification, $F(1, 9) = 10.40, p = .01$. Within the Waterford condition, there were no significant differences between new and experienced teachers on any of the literacy measures. These results were consistent with those obtained through the intervention versus comparison analyses focused on the inclusion or exclusion of experienced teachers.

Language-Minority Analyses

Significant pre- and post-test differences emerged between English-dominant and language-minority children on the literacy measures. As a group, children designated as Spanish-speaking at Head Start entry performed significantly more poorly on six of the seven literacy measures at pretest (no significant differences were observed on Print Conventions), and on all eight measures at posttest, as compared with their English-dominant peers.

Significant differences also emerged when looking at the amount of gain made by children across the Head Start year. Repeated measures analyses demonstrated that on the PPVT, Spanish-speaking children gained significantly more than did English-dominant children across the school year, $F(1, 494) = 9.01, p = .00$. However, Spanish-speaking children still remained significantly below English-dominant children by the end of the school year on this measure. English-dominant children made significantly greater gains across the year on a number of measures, including Letter-Word Identification, $F(1, 429) = 10.17, p = .00$, Book Knowledge, $F(1, 503) = 13.21, p = .00$, Print Conventions, $F(1, 504) = 9.44, p = .00$, and the Get Ready to Read! Screen, $F(1, 491) = 4.92, p = .03$. There were no significant differences in gains on either Letters Known, $F(1, 504) = 2.83, ns$, or Comprehension, $F(1, 504) = .08, ns$, as a result of language status.

DISCUSSION

This study demonstrated the small but positive effects of two emergent literacy curricula on children’s early literacy skills, specifically their letter knowledge, letter-sound correspondence, book and print knowledge, and emergent writing. In our sample of children from low-income backgrounds, results indicated that
these specific emergent literacy skills were enhanced with a literacy-focused curriculum added to the existing preschool curriculum framework. This study is unique in that it examined the effects of two literacy curricula whose approaches towards teaching emergent literacy skills were distinctly different. While both curricular approaches demonstrated positive effects on emergent literacy skill outcomes, the broader, teacher-directed *Let’s Begin* demonstrated influence on a greater number of key emergent literacy skills than did the computer-based *Waterford*. This study adds significantly to the literature on early literacy, which, to date, has not focused on evaluating preschool literacy curricula currently in use in the field.

The emergent literacy curricula had their greatest effects on code-related skills that underlie the later task of decoding words, such as letter knowledge, letter-sound correspondence, book and print knowledge, and emergent writing. The two intervention curricula did not have significant effects on children’s oral language skills, specifically their receptive vocabulary and comprehension abilities. It is possible that the High/Scope method in effect in all classes of the study equalized these skills. Alternatively, this finding is consistent with research that has demonstrated that children’s language skills are largely driven by home influences, whereas code-related skills are largely driven by teaching interactions (Crone & Whitehurst, 1999; Evans, Shaw, & Bell, 2000; Storch & Whitehurst, 2001; Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel, 1994).

As participants in the Quality Research Center consortium, children in our sample were tested on a wider range of measures than simply the literacy-related measures of interest to this study. Measures tapping fine-motor skills, sustained attention, and early math concepts were also administered. One might argue that the increased researcher/professional trainer attention in intervention classrooms, as well as the increase in child-related learning tools and activities, contributed to produce an overall enhanced classroom environment leading to a wide-variety of improved outcomes. Importantly, however, neither literacy intervention produced significant outcomes on these other, nonliteracy-related measures as compared with the comparison condition.

The varied demographics of our sample allowed for study of the role of language status on outcome. Specific analysis of the effects of language status on child outcomes revealed that, on average, children whose primary language was Spanish upon Head Start entry had significantly lower levels on the majority of emergent literacy skills at both Head Start entry and exit. This is consistent with the FACES 2000 finding (ACYF, 2003) that Spanish-speaking children entered and exited Head Start with significantly lower English vocabulary skills. Prior research has demonstrated that children who entered Head Start with lower skills tended to make greater gains (ACYF); likewise, Spanish-dominant children tended to make larger gains across the school year due to their lower starting point. In the FACES study (ACYF) Spanish-speaking children averaged a gain
of 7 points on the PPVT-III, compared with a gain of only 4.3 standard score points for the sample as a whole. Similarly, in our sample, Spanish-dominant children made a significantly greater gain in receptive vocabulary (7.14 standard score points vs. 3.11 for English-dominant children), likely a result of immersion in an English-speaking preschool environment, as well as the tendency of scores to move closer to the population mean over time. However, the rate of growth of Spanish-dominant children on several other key emergent literacy skills, including letter, book, and print knowledge, was significantly less than that of their English-dominant peers. Interestingly, this significantly slower rate of gain for Spanish-speaking children occurred specifically on measures of code-related skills, those that research has demonstrated are influenced most by instructional activities. Might weaker English language skills have attenuated learning, preventing the Spanish-dominant children from benefiting from classroom activities that promoted these code-related emergent literacy skills? It is clear that fuller attention needs to be paid to facilitating optimal progress for English Language learners in early literacy skills. The complexity of second-language learning may be larger than any single preschool-based literacy intervention can solve.

Our research design of replication and expansion allowed for examination of the effects of experienced teachers on outcomes. Results suggest that classrooms led by teachers experienced in the Let’s Begin curriculum performed significantly better on measures of letter knowledge than did classrooms led by either comparison teachers or first-time Let’s Begin teachers. Interestingly, experience effects did not occur within the Waterford curriculum. Given the nature of each curriculum, it makes sense that the one relying more heavily upon teacher direction, input, and creativity would be more susceptible to improvements in implementation over time. As letter knowledge is a skill central to Let’s Begin, it is reasonable to expect that this skill would be a prime target for improvement with repeated use of the curriculum.

The results of the mixed-effects ANCOVAs demonstrated that classroom factors other than the experimentally manipulated literacy interventions also played a significant role in several literacy outcomes. Notable was the differential impact of classroom factors on the various literacy outcomes. For instance, whereas classroom factors accounted for a large percentage of variance in letter knowledge and a small but significant amount of variance in receptive vocabulary, comprehension, and print knowledge, classroom factors demonstrated no significant effect on measures of emergent writing or book knowledge. We continue to explore the variables in classrooms, regardless of curriculum, that might contribute to differences in emphasis on letters, print, and oral language in contrast to early writing and book knowledge. Some variables of interest might include quality of the classroom environment (e.g., ECERS-R; Harms, Clifford, & Cryer, 1998), lead teacher behavior (e.g., Arnett Scale of Caregiver Behavior; Arnett, 1989), prioritization of classroom practices (e.g., Preschool Classroom Practices...
Q-sort; Bracken & Fischel, 2006; Bracken, Fischel, & Katz, 2005), and child behavioral characteristics (e.g., Behavior Assessment Scale for Children; Reynolds & Kamphaus, 1992).

LIMITATIONS

When interpreting the result of this research, it is important to consider the limitations of this study. First, all classrooms in this study were part of a single Head Start grantee, and just as Head Start is not a homogenous program, it is also likely there is variation in the needs of children in Head Start across the country. In addition, some of the outcome measures chosen in this study, specifically those developed for FACES and used in the HSQRC projects, are relatively new measures that have only been used with populations of Head Start children to date and whose reliability is lower than other established measures. Also, in this study we tested two widely used literacy programs, overlaid on another popular preschool curriculum, High/Scope. Thus, the positive results demonstrated by children in the *Let's Begin* and *Waterford* conditions must be interpreted within the context of the High/Scope Approach and could be different if these literacy interventions were overlaid on other foundations or stood alone. Moreover, it is important to acknowledge that along with the ability to integrate the enhancement into existing curricular methods, selection of a literacy curriculum by preschool staff outside of a research study may take several other characteristics into consideration, such as existing staff knowledge and skills, staff turnover, class size, and program cost.

This study did not examine the specific components of each of the literacy interventions that contributed to the significant differences. Rather, we evaluated each literacy enhancement as a complete package. Thus, no claims can be made about the specific components of each that may have played a role in the positive results. Additionally, it may not be surprising that adding something to the preschool classroom, in the form of a literacy enhancement, results in increases in children’s literacy skills. On the other hand, achieving significant, positive results with a low-income population, with the interventions delivered by teachers who have a number of responsibilities and obligations in the classroom is not always a certainty, making these positive findings valuable.

FUTURE RESEARCH

Future studies must be designed to answer questions about what parts of each program are most important and whether teachers need to adopt these specific
programs or could be equally effective addressing literacy instruction with other approaches. Given the promising outcomes demonstrated by the intervention curricula, it will be particularly important for future research to address the relative lack of effect on oral language skills, particularly vocabulary knowledge and comprehension. Though both Let’s Begin and Waterford demonstrated significant gains on various code-related skills, these curricular approaches appear to have had little effect on increasing children’s oral language skills beyond the effects gained in classrooms using the comparison High/Scope curriculum. If the PPVT posttest scores of children exiting Head Start were near the national average, perhaps the preschool experience alone would be sufficient for preparing low-income children for elementary school, and oral language skills would not need to be addressed specifically by an early literacy curriculum. However, children in our sample exited Head Start, overall, with receptive vocabulary scores ranging from the 16th to 21st percentile, well below the national average. While exit scores reflect important gains over entry vocabulary scores, in actual standing they increased from only a range of the 12th to 16th percentile at preschool entry. Our sample’s performance is consistent with national Head Start means as measured by the FACES 2000 sample; in this national sample, the entry mean on the PPVT was 85.3 and the exit mean was 89.1, corresponding to the 16th and 23rd percentiles, respectively (ACYF, 2003). It seems prudent to address the oral language skills of low-income preschoolers, given the research demonstrating the far-reaching importance of oral language skill development (e.g., Storch & Whitehurst, 2002). Wells’s (1985, 2003) research highlighted the importance of the quality of children’s linguistic experiences at home and in preschool in their language development and eventual literacy skill, suggesting that this is a key component of literacy that must not be overlooked. In another vein, focused specifically on home and family contributions to teaching and learning for minority and English language learning children, Moll and colleagues (Moll, Amanti, Neff, & González, 1992; González, Moll, & Amanti, 2005) urged a fuller understanding and employment of “household funds of knowledge” to reorganize and better connect classroom instruction to children’s experience and social context.

Another important area for future investigation is the effect of parent participation in the existing home components of classroom-based literacy programs. Both literacy approaches used in this study have a small home piece, though they differ in the degree to which they require active parent involvement. Let’s Begin has a set of take-home activity sheets designed to be completed with the help of an adult, whereas Waterford has a set of take-home books and videos that welcome but do not demand parent participation. This study did not assess the degree to which parents engaged their children in these home activities, but possible effects of parent involvement on enhancing children’s outcomes should be explored further. Prior research has demonstrated that parents of preschoolers
engage in formal teaching interactions much less often than they do informal, shared reading interactions (Evans et al., 2000). It would be interesting to determine whether providing parents with teaching materials that map directly onto what their preschool children are learning would increase the likelihood of parent participation in activities aimed at teaching code-related skills. It is important to consider, however, the time and resources parents may have to dedicate to such home activities.

Future research must also consider the long-term effects of these preschool literacy interventions. That is, are the gains made in letter knowledge, emergent writing, print and book knowledge maintained into elementary school? Do they translate into better reading outcomes? Results of the FACES study indicated that the size of gains made by children during the Head Start year were predictive of their performance at kindergarten exit (ACF, 2003). However, Whitehurst, Zevenbergen, Crone, Schultz, Veting, and Fischel (1999) found that although intervention gains made during preschool were maintained through kindergarten, such effects were eliminated by first and second grade. Although the authors presented several possible explanations for this result, one major explanation centered on the characteristics of the elementary schools attended by the sample following their Head Start year. It will be important to explore whether the effects of interventions such as those studied here are maintained, enhanced, or diminished, and whether such outcomes are tied to characteristics of the attended elementary schools.

SUMMARY

This study adds significantly to the literature in its application of a rigorous, randomized trial design as a model for the investigation of preschool literacy curricula. Results of the study hold promise for the implementation of literacy curricula in preschool classrooms serving low-income children and demonstrate the enhancement of literacy skills so critical for future school success. The implication of these results for social and educational policy is that federally funded preschool programs might increase their capability to prepare children from low-income backgrounds for school, particularly for successful reading skills, through the addition of evidence-based literacy curricula that address important early literacy skills.

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