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Applying a Response-to-Intervention Model for Early Literacy Development in Low-Income Children

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This article describes the design and implementation of a program that incorporates a response-to-intervention (RTI) framework for promoting the development of early literacy and language skills among low-income minority children. The early literacy program, called the Exemplary Model of Early Reading Growth and Excellence, or EMERGE, combines classroom practices that are grounded in empirical research, a multitiered intervention hierarchy, high-quality professional development, and continuous progress monitoring to help children in Head Start classrooms acquire early literacy competencies to prepare them for later success in school. Preliminary program evaluation data are presented, and challenges associated with applying an RTI model in early childhood education are addressed.

Keywords: early literacy; response-to-intervention; progress monitoring; multitiered instruction; Head Start

Learning to read and write begins early in children's development, long before they enter kindergarten. Moreover, literacy skill development in early childhood provides the foundation for children's long-term academic success. Over the past two decades, researchers have identified key emergent literacy skills that develop progressively in children during their preschool years and are highly predictive of later success in learning to read (Burns, Griffin, & Snow, 1999; Casey & Howe, 2002; Neuman & Dickinson, 2001; Whitehurst & Lonigan, 1998, 2001). These skills include phonological awareness (e.g., hearing and manipulating smaller sounds in words), letter knowledge (e.g., identifying and naming letters), print awareness (e.g., noticing print and following words on a page), and oral language (e.g., describing events and telling stories).

Many young children face significant challenges in learning to read because they lack essential early literacy skills when they begin school. In fact, children who are poor readers at the end of elementary school are most often those who fail to develop early literacy skills during preschool and kindergarten (Torgesen, 1998). Deficits in early reading skills at the beginning of kindergarten tend to remain, or even increase, through elementary school, creating a continuously widening gap between children who have good literacy skills and those

who do not (Badian, 2000; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1999; Juel, 1988; Scarborough, 2001; Snow, Burns, & Griffin, 1998; Stanovich, 2000). Unfortunately, children who enter kindergarten with limited literacy and language skills rarely catch up and are at high risk of being referred for special education services (Whitehurst & Lonigan, 1998, 2001). A child who completes second grade without being able to read, for example, has only a 25% chance of reading at grade level by the end of elementary school (Snow et al., 1998). Furthermore, the majority of children with reading difficulties in Grade 4 will continue to have reading problems at the end of high school, and they have a higher probability of dropping out of school (Scarborough, 2001).

Additional research has identified risk factors that make certain groups of children particularly vulnerable to difficulties in acquiring early literacy skills (Bryant, Burchinal, Lau, & Sparling, 1994; Snow et al., 1998). Weaknesses in skills and subsequent reading failure are most common among low-income, non-White children and among children with limited proficiency in English (Hart & Risley, 1995; Snow et al., 1998). For example, on the 1998 National Assessment of Educational Progress (National Center for Education Statistics, 1999), 68% of fourth graders who qualified for free or reduced lunch scored below the basic level of achievement in reading, compared to only 25% of students who did not qualify for reduced lunch. The development of children's language and literacy is heavily influenced by home literacy practices. Compared to children from middle-income families, children from economically disadvantaged families experience significant difficulties learning to read and write because they enter school with lower knowledge of letters and less familiarity with words. Children from low-income families and with limited English proficiency are often reared in homes that fail to provide sufficient early literacy experiences and materials to promote print-related skills; their families typically do not support the acquisition of literacy skills to the same degree that parents of higher socioeconomic status do (Campbell, Goldstein, Schaefer, & Ramey, 1991; Lonigan, Burgess, Anthony, & Barker, 1998). For example, middle-income children begin school having had as many as 6,000 books read to them, whereas children from low-income families may start school without ever having been read to at home (Moustafa, 1997).

Collectively, these findings underscore the importance of developing and implementing models to promote early literacy development among young, at-risk children to ensure they enter kindergarten with the requisite skills and knowledge to become successful readers. High-quality early intervention programs can reduce the number of children who enter school with weak literacy skills. According to the National Research Council, implementing evidence-based emergent literacy strategies in preschool can prevent reading problems in elementary school and ultimately reduce the need for special education services (Snow et al., 1998).

The recent shift toward implementing a response-to-intervention (RTI) model with low-achieving elementary and secondary students is consistent with the current emphasis on prevention and early intervention for preschool children (Batsche et al., 2005; Fuchs & Fuchs, 2006). Inherent to an RTI approach is the practice of providing high-quality instruction and supplemental individualized support, based on children's needs, through a multitiered model. RTI hinges on the use of systematic screening and progress monitoring to enable teachers to provide well-targeted instruction and individualized support when delays are evident. Specifically, children who are not making adequate progress toward developing early literacy skills are identified on the basis of progress-monitoring data and provided with scaffolded instruction to meet their needs (Coleman, Buysse, & Neitzel, 2006).

The focus of RTI on prevention, research-based interventions, and data-based decision making is clearly aligned with the goals of early intervention. Nonetheless, RTI models have not been widely implemented or documented in early education contexts (VanDerHeyden & Snyder, 2006). Some multitiered intervention models have been described in the early intervention literature. Sandall and Schwartz (2002), for example, developed a model of teaching young children with special needs in preschools. Their model incorporates a tiered intervention hierarchy that includes making curriculum modifications, embedding a focus on individual children's objectives in typical classroom activities, and providing individualized instruction aimed at achieving individualized education program goals. More recently, a multitiered model for intervening with young children at risk for learning disabilities, titled Response and Recognition, has been developed at the University of North Carolina's Frank Graham Porter Child Development Institute (Coleman et al., 2006). This model is designed to help teachers recognize early indicators of learning delays and, in turn, respond with appropriate instruction and assistance. With these exceptions, however, most of the literature documenting the application of RTI to early intervention focuses on challenging behaviors in young children, not necessarily on early literacy skills (e.g., Barnett et al., 2006).

The purpose of this article is to describe the design, implementation, and preliminary evaluation of an early intervention model for promoting the development of emergent literacy skills among low-income, minority children in the context of community-based Head Start settings. The program described in this article demonstrates the application of an RTI framework and multitiered intervention model for enhancing early literacy competence and, in turn, preventing reading failure and the need for special education among high-risk young children. After a description of the early childhood context for the program, we explain the four interrelated RTI components and demonstrate their implementation in Head Start classrooms.

Overview of Program

The early literacy program described in this article, called the Exemplary Model of Early Reading Growth

and Excellence, or EMERGE, is a partnership between the Social Development Commission (SDC) Head Start of Milwaukee, the Head Start–Day Care Partner Program of Milwaukee, and the University of Wisconsin in Milwaukee and Madison. The EMERGE program is an Early Reading First project funded through the U.S. Department of Education (2005–2008). Through a combination of (a) classroom practices grounded in empirical research, (b) a multitiered intervention hierarchy, and (c) high-quality professional development, EMERGE is designed to help children from low-income families acquire early literacy skills to prepare them for later success in school.

Participating Sites, Teachers, and Children

The EMERGE program includes 15 classrooms housed in five center-based, early childhood programs that serve low-income families residing in racially segregated and culturally diverse neighborhoods in Milwaukee, Wisconsin. The participating classrooms provide full-day, year-round programming for children across 2 consecutive years prior to kindergarten entry. Classrooms are staffed by one lead teacher (who holds at least an associate's degree in early child education) and a classroom aide; each classroom enrolls about 18 to 20 children. Approximately 90% of the children in EMERGE are from families that meet income guidelines for the federal poverty level. The majority of children are African American (90%–95%), with 6% to 10% of Hispanic origin and less than 2% White/other.

Conceptual Framework for EMERGE

Within the past decade, several comprehensive reports have synthesized the converging evidence about the development of early literacy skills, including *Teaching Our Youngest* (Early Childhood–Head Start Task Force, 2002), *Preventing Reading Difficulties in Young Children* (Snow et al., 1998), *Teaching Children to Read* (National Reading Panel, 2000), and *Put Reading First: The Research Building Blocks for Teaching Children to Read* (Armbruster, Lehr, & Osborn, 2003). Collectively, these sources have provided evidence that (a) learning to read is based on the foundation skills of phonological awareness, oral language, alphabet knowledge, and print awareness; (b) children who have acquired these skills profit more from formal reading instruction than do children without them; and (c) reading success requires coherent, intentional instruction in these skills before entering kindergarten. Building on this evidence base, the EMERGE program is predicated on the assumption that children require continuous exposure to and structured interaction with print; frequent oral and written language interactions with adults; and systematic, explicit instruction to develop skills. In addition, EMERGE is based on the knowledge that literacy environments play a key role in developing children's language and early reading skills. Finally, EMERGE is grounded in the belief that early childhood teachers require sustained, high-quality professional development to be successful in promoting children's literacy development.

Program Goals and RTI Components

Based on these conceptual understandings of early literacy development, the EMERGE program targets four interrelated goals. The first is to develop and implement a multitiered instructional model that (a) maximizes the use of research-based practices to support children's development of four early literacy skills; (b) increases the amount of time children are engaged in interactive shared book reading; and (c) incorporates the use of a thematic, integrated, research-supported curriculum. The second goal is to implement screening and progress-monitoring procedures to identify children who require more intensive intervention than what is provided through the instructional and environmental enhancements in the regular classroom. The third goal is to create high-quality, literacy-rich learning environments that support the development of young children's early literacy and language skills and promote positive learning behaviors. The final goal of EMERGE is to provide intensive and continuous professional development and ongoing literacy coaching that is grounded in scientifically based knowledge of early literacy development.

Consistent with these program goals, EMERGE incorporates the following key components of an RTI approach: (a) scientifically based early literacy curriculum, instruction, and activities provided at increasing levels of intensity across a three-tiered intervention hierarchy; (b) screening, monthly progress monitoring, and outcome assessment to guide instructional decision making and identify children who require a more intensive focus on early literacy skills; (c) high-quality, literacy-rich classroom environments; and (d) ongoing professional development combined with literacy coaching and collaborative planning.

Another critical component of the EMERGE program is family involvement. Because of the important role families play in promoting young children's literacy development, the family involvement component of EMERGE may be conceptualized as one aspect of evidence-based practice within the multitiered model. For purposes of this discussion, however, we have limited our description of intervention tiers to practices that are implemented specifically in the context of Head Start

classrooms. Nonetheless, it is important to note that as part of the EMERGE program, a family literacy center operates 1 day every week in participating early childhood sites. This center is staffed by literacy specialists who offer suggestions to families about home-based activities and allow parents and children to sign out developmentally appropriate books to read together at home. In addition, included in the EMERGE literacy resources are take-home books and nursery rhymes that are read multiple times with children in classrooms and distributed to families on a weekly basis. Finally, families receive a monthly newsletter that describes the curriculum theme, target letters, and theme-related activities to complete with children at home.

In the following sections, we describe the development and implementation of the four EMERGE components. In addition, we present preliminary program evaluation data and discuss conclusions regarding the application of RTI to early childhood education.

Three-Tiered Intervention Hierarchy

High-quality instruction is essential for early literacy skill development in young children. The notion of quality in early literacy instruction is multidimensional and includes the classroom environment, teaching behaviors, and curriculum materials. The use of a three-tiered intervention hierarchy ensures that all children have access to high-quality early literacy practices. The tiers in the EMERGE hierarchy represent increasing levels of intensity and individualization of early literacy instruction, which has been found to be effective through empirical research. As shown in Figure 1, Tier 1 includes a research-supported curriculum, a literacy-rich environment, and instructional activities to support children's development of phonological awareness, oral language, alphabet knowledge, and print awareness. In Tier 1, the focus is on optimizing the quality of the overall environment and classroom practices to promote early literacy development among all children. Teachers participate in professional development, weekly coaching sessions, and collaborative planning to provide high-quality, scientifically based instruction and to create literacy-rich classrooms. Tier 2 (see Figure 1) includes daily, teacher-directed, small-group instruction that provides greater exposure to language and print, additional practice with literacy skills, and/or activity adaptations for groups of 4 to 6 children based on their individual needs. Similar to the support provided to teachers for Tier 1 instruction, all teachers and aides receive training and coaching to plan and implement Tier 2 instruction. Finally, Tier 3 (see

Figure 1
Exemplary Model of Early Reading Growth and Excellence (EMERGE) Multitiered Intervention Hierarchy
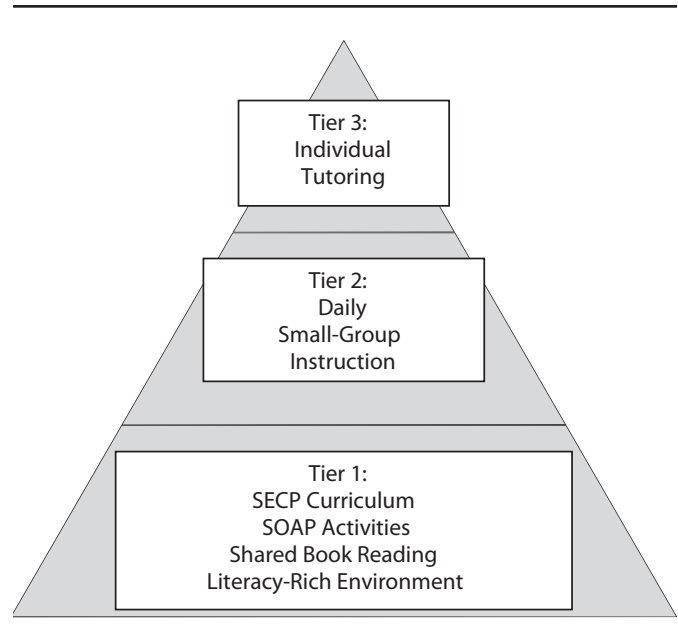
Note: SECP = Scholastic Early Childhood Program; SOAP = sound awareness, oral language, alphabet knowledge, and print awareness.

Figure 1) includes intensive, individualized tutoring whereby children receive explicit and highly focused training in early literacy skills from specialized early literacy tutors. Tier 3 instruction is provided for children identified to be at highest risk for developing reading difficulties (i.e., approximately 20% of children scoring at the lowest levels on early literacy screening measures). Support for Tier 3 tutors, who are preservice education students at the University of Wisconsin, includes participation in 3-hour training sessions and regular group meetings.

Whereas each tier in the EMERGE hierarchy differs in the intensity and individualization of early literacy instruction provided, two key features are constant across all tiers. First, the activities and strategies provided within each tier are designed to achieve the same core literacy goals and incorporate scientifically based practices for early literacy development. There is a common emphasis across all tiers on strengthening fundamental skills that have been shown to predict optimal reading development in elementary school. In EMERGE, we use the acronym SOAP to help teachers, classroom aides, and tutors remember these skills. The letters in SOAP stand for sound awareness (rhyming, alliteration, segmenting, blending), oral language (vocabulary development, expressive language, listening comprehension), alphabet knowledge (letter recognition), and print awareness. In effect, each

EMERGE tier represents an increasingly stronger focus on, and greater assistance with, acquiring SOAP skills. Using alphabet knowledge as an example, all children receive instruction on target letters every week as part of the regular classroom activities (Tier 1). By providing children with multiple opportunities to respond during Tier 1 instruction, teachers are able to observe students' levels of alphabet knowledge. In addition, monthly progress monitoring enables teachers to determine which children require extra practice on letter identification. Based on progress-monitoring data, as well as on teachers' observations during instruction, children are selected to receive additional support and instruction during teacher-directed, small-group activities (Tier 2). Finally, data from screening and midyear outcome assessment are used to identify the lowest 20% of students; these students are provided with intensive and individualized practice focusing on alphabet knowledge (Tier 3).

A second common feature across all intervention tiers is the adherence to a consistent curricular sequence (e.g., standard progression through content themes, focus on the same target letters, etc.) and reliance on manualized strategies (described later) to guide the provision of instruction and/or tutoring. Furthermore, monthly professional development sessions, combined with weekly on-site coaching and collaborative planning with the EMERGE literacy coach, enable teachers to implement scientifically based practices with high levels of integrity.

Both features of the EMERGE tiered intervention model represent notable departures from the typical application of RTI with older children. Within an RTI model for older students, Tier 2 and Tier 3 interventions are often conceptualized as different from Tier 1 universal interventions, rather than as a stronger dosage of the same content. Another distinction is the higher degree of flexibility and frequency in movement between tiers in the EMERGE model based on multiple indicators of children's responsiveness to Tier 1 instruction. Development of young children's emergent literacy skills is characteristically sporadic and variable over time. Thus, determining the need for Tier 2 scaffolded instruction may rely on teachers' ongoing observations of children's progress and performance during everyday learning situations, in addition to monthly progress-monitoring data. Despite these important distinctions, the conceptualization and design of intervention tiers in EMERGE are highly consistent with an RTI approach, as described in the following.

Tier 1 Instruction

The first step in EMERGE's multitiered approach is establishing exemplary, scientifically based literacy practices within each classroom by focusing on environmental quality (which is a separate program component, as discussed later), a comprehensive curriculum, and research-based early literacy strategies. Tier 1 instruction is built around three core elements. The first is the use of a research-supported curriculum, specifically the Scholastic Early Childhood Program (SECP; Block, Canizares, Church, & Lobo, 2003). SECP is a comprehensive curriculum that integrates a primary emphasis on language and literacy with other learning domains, including math, science, and social studies. The curriculum is structured around a set of 3-week, thematic units. Based on input from EMERGE teachers regarding their students' learning needs, each SECP unit was extended to cover 4 to 5 weeks to provide expanded coverage of vocabulary and literacy concepts and additional review of target letters. SECP is organized around daily routines based on current knowledge of best practices in early childhood education (Neuman, Copple, & Bredekamp, 2000). The curriculum provides explicit guidelines for structuring each day to include whole-group circle time, student-directed learning centers, story time, and teacher-guided transitions. The high degree of structure in SECP was deemed important for SDC Head Start teachers, many of whom have limited prior professional training in scientifically based early literacy practices.

The second element of Tier 1 is the provision of teacher-directed SOAP activities through large- and small-group instructional formats. To standardize this element across classrooms and to promote intervention integrity, a scripted manual of evidence-based strategies that support the development of sound awareness, oral language, alphabet knowledge, and print awareness was developed by the program directors (the authors). This manual, titled *SOAP Strategies: Building Blocks of Early Literacy*, is provided to all teachers. For each SOAP skill, the manual (a) describes and defines the skill, (b) explains its importance for literacy development, (c) lists 3 to 5 developmentally appropriate goals (e.g., "Children will recognize or 'read' familiar environmental print, especially common signs and classroom labels"), and (d) provides 8 to 10 pages of research-supported instructional strategies for strengthening each skill. To ensure implementation of SOAP strategies, teachers' weekly lesson plans include structured SOAP activities for at least 10 to 15 minutes each day. The EMERGE literacy coach conducts classroom observations on a biweekly basis using the week's lesson plan as an integrity checklist. During the 2005–2006 school year, EMERGE teachers implemented, on average, 90% of lesson plan components, with 100% implementation of daily SOAP activities.

The third element of Tier 1 instruction is adult–child shared book reading (SBR; Whitehurst et al., 1999). Adult–child interactions during book reading have a significant positive impact on children's emergent literacy (Justice & Kaderavek, 2002). Specifically, children learn more from books when they are actively involved in reading them. In EMERGE, we use the term *shared book reading*, or *SBR*, to refer to this component of Tier 1 instruction. Two types of evidence-based practices are incorporated into daily SBR: (a) dialogic reading (Whitehurst et al., 1999), which includes asking open-ended questions, following children's answers with additional questions, repeating and expanding what children say, and following children's leads and interests and (b) print referencing (Ezell & Justice, 2000), which includes talking about print (e.g., "Where is the letter *A* on this page?") and pointing to print during reading. Similar to SOAP strategies, to standardize the SBR element across classrooms, teachers receive a manual, titled *Shared Book Reading to Promote Early Literacy and Language Skills*, which includes (a) activities to guide teacher–child interactions before reading (e.g., children make predictions), during reading (e.g., children respond to open-ended questions), and following reading (e.g., children retell the story) and (b) activity cards that provide scripted interactions and questions to accompany individual books supplied to classrooms. (See Appendix A for an example of an SBR activity card.) In addition to theme-related books that accompany the SECP curriculum, teachers receive 5 to 7 thematic books with at least one book from each of five categories (rhyming/alliteration, repetition/pattern, knowledge/nonfiction, math/science content, social/multicultural). To ensure implementation of SBR strategies, teachers' weekly lesson plans include at least two book-reading sessions (20–25 minutes), one in the morning and another in the afternoon. Classroom observations of book-reading periods during 2005–2006 indicated that teachers appropriately implemented SBR, on average, 90% of the time (i.e., used selected books and implemented print referencing, dialogic reading, and other strategies from the activity cards).

Tier 2 Instruction

Tier 2 small-group instruction is provided for children who need extra assistance to make adequate progress in developing early literacy skills. Research shows that a small-group format may be more effective in helping children acquire SOAP skills compared to a large-group format for teaching the same skills (Elbaum, Vaughn, Hughes, & Moody, 1999). Tier 2 instruction is provided directly by teachers in classrooms to small groups of children. Tier 2 includes planned, teacher-directed activities that are designed to provide a stronger focus on SOAP

skills for small groups of 4 to 6 children and to adapt SOAP strategies to children's needs, such as focusing on fewer alphabet letters at one time, providing additional practice with simple rhyming patterns, or adding more kinesthetic–tactile activities.

To guide the implementation of Tier 2 instruction, a manual of evidence-based strategies was developed through collaboration with SDC and EMERGE staff. Specifically, a Tier 2 Task Force, including the program directors, the EMERGE literacy coach, five SDC Head Start teachers, and SDC site supervisors, held multiple meetings to review the SECP curriculum and design supplemental small-group activities aimed at strengthening the focus on SOAP skills. The resulting manual, titled *Small-Group Activity Curriculum Supplement*, is provided to each teacher and classroom aide to assist in planning and implementing small-group activities.

The Tier 2 manual is divided into two sections. Section 1 is titled General SOAP Activities. These activities are designed to be used across all curriculum themes and focus on the development of SOAP skills. Three subsections (Alphabet Knowledge Activities, Sound Awareness Activities, and Oral Language and Print Awareness Activities) include detailed descriptions of 25 to 30 small-group activities. Section 2 of the Tier 2 manual is titled Theme-Related Activities. This section includes developmentally appropriate activities designed to supplement the thematic content of the core SECP curriculum. Each subsection includes 10 to 13 small-group activities that combine a relevant thematic focus with an emphasis on SOAP skills as well as suggestions for integrating math or science concepts into the activity. (See Appendix B for an example of a theme-related activity description.) Similar to all EMERGE components, Tier 2 small-group activities from the manual are included in weekly lesson plans, and implementation is observed biweekly by the literacy coach.

Tier 3 Instruction

Tier 3 instruction is provided by tutors who are undergraduate and graduate students in early childhood education, elementary education, or school psychology at the University of Wisconsin– Milwaukee. All tutors ($N = 15$) participate in a 3-hour training session conducted by the first author, with follow-up sessions at 3-month intervals. Each tutor receives a tutoring kit (alphabet cards, alphabet puzzle, writing tools, and other resources) and a scripted tutoring manual. Tutors also have access to a developmental range of books from each of the five categories (listed earlier) and additional tutoring resources.

Tier 3 instruction is provided individually to children, two to three times weekly. Each 20-minute tutoring

session includes two components: (a) SBR (children and tutors read developmentally appropriate books together) and (b) letters and sounds (tutors provide explicit instruction in letter naming, letter writing, alliteration, and rhyming). Each tutor adheres to the same schedule of target letters and themes as in EMERGE classrooms such that Tier 3 instruction serves to extend and reinforce the instructional focus of Tier 1 and Tier 2. Similar to Tiers 1 and 2, Tier 3 individual tutoring is guided by a manual of research-based activities that include SBR (dialogic reading and print-referencing strategies) and SOAP strategies. To maintain communication and collaboration between teachers and tutors, tutors complete individual logs, which are kept in the classrooms, detailing the activities and children's progress during tutoring sessions.

Screening, Progress Monitoring, and Outcome Assessment

Implicit in the tiered intervention model of EMERGE is a link to child data as the basis for instructional decision making. The assessment component of EMERGE is designed to incorporate the use of screening and progress-monitoring procedures that have good predictive utility for identifying preschool children at risk for reading failure and to ensure that instruction is scaffolded across tiers to meet all children's needs. Moreover, the assessment component is multidimensional (focusing on several dimensions of early literacy including vocabulary, phonological awareness, letter knowledge, and oral language) and combines both norm-referenced and informal assessments of children's skills.

Screening and Outcome Assessment

Screening data (collected in September) are used to (a) establish a baseline level of functioning for all children and (b) identify the lowest performing 20% of children to receive Tier 3 individual tutoring during the first half of the school year. We decided to provide 20% of EMERGE children with Tier 3 instruction instead of the 5% to 10% of children who are estimated to require Tier 3 interventions in most RTI models (see Batsche et al., 2005). This decision was based on the overall high level of risk among children at baseline. For example, approximately 60% of the sample scored below the normative average on the *Peabody Picture Vocabulary Test–III* (PPVT-III; Dunn & Dunn, 1997). Subsequent midyear assessment data (January) are used to (a) evaluate the effectiveness of EMERGE for all children, (b) determine environmental or instructional modifications needed in individual classrooms, and (c) identify the

lowest 20% of children to receive Tier 3 tutoring during the second half of the year. Finally, the end-of-year assessment (May) provides an evaluation of the benefits of EMERGE for all children.

The screening and outcome assessment battery includes three measures that are administered individually to children by trained testers three times each year (in September, January, and May). The measures include (a) the *Phonological Awareness and Literacy Screening– PreKindergarten* (PALS-PreK; Invernizzi, Sullivan, Meier, & Swank, 2004), (b) the PPVT-III, and (c) an informal oral-story-retelling measure that we developed.

The PALS-PreK (Invernizzi et al., 2004) is designed to measure preschoolers' developing knowledge of literacy skills that are predictive of future reading success (median correlation with kindergarten reading is .70). Trained EMERGE testers administer three subtests from the PALS-PreK as part of the comprehensive screening and assessment battery. The first subtest, Name Writing, is a strong indicator of early literacy development given its well-established link to letter recognition and print awareness (Welsch, Sullivan, & Justice, 2003). The second subtest, Alphabet Knowledge, is also included as a monthly progress-monitoring measure (described later). For this task, children name uppercase alphabet letters presented in random order, identify lowercase letters (if 16 or more uppercase letters are named), and produce the sounds associated with letters (if 9 or more lowercase letters are named). The third subtest, Print and Word Awareness, uses a book-reading activity to assess children's awareness of print concepts such as directionality, function of book parts (e.g., title), and the difference between pictures and words.

The informal oral-story-retelling task was developed specifically for EMERGE as a measure of oral expressive (speaking) vocabulary and of memory and comprehension of short stories. Oral-story retelling is a good predictor of a child's reading success. Numerous studies support the use of story retelling for a variety of diverse learners, including young children, low-ability readers, and children with limited English proficiency (Searfoss, Readence, & Malette, 2001). The oral-retelling task developed for EMERGE involves reading aloud a short story (90–95 words) that has three accompanying pictures (one picture for approximately every 30 words). After hearing the story and seeing the pictures, children are asked to retell everything they remember about the story (while looking at the pictures). Scoring of children's retelling is based on the number of main ideas they accurately retell.

Finally, the PPVT-III (Dunn & Dunn, 1997) is administered as a measure of children's receptive (listening) comprehension and vocabulary acquisition. This test is the

most widely used, norm-referenced measure of vocabulary for individuals who exhibit a range of diverse abilities. According to the Center for the Improvement of Early Reading Achievement, children's early literacy skills build on a strong foundation of vocabulary and language development (Armbruster et al., 2003). Thus, vocabulary is included among the skills that are necessary for learning to read and serves as a good indicator of children's early literacy development (Scarborough, 2001).

Progress Monitoring

In EMERGE, children's responsiveness to Tier 1 instruction is monitored by classroom teachers on a monthly basis. In addition, aggregated classroom progress-monitoring data are used to determine the extent to which Tier 1 instruction is effective in promoting progress in literacy skill development among all children and/or whether teachers need assistance in integrating a stronger focus on SOAP skills. As such, progress-monitoring tools that accurately reflect a child's ability to benefit from instruction are a key feature of EMERGE.

In recent years, significant progress has been made toward developing individual growth and development indicators (IGDIs), which are useful for screening and monitoring skills that reflect progress in early literacy and language development among preschool children (Early Childhood Research Institute on Measuring Growth and Development, 1998; Missel, McConnell, & Cadigan, 2006). IGDIs are comparable to the progress-monitoring procedures used with older students in that they are quick and easy to administer by classroom teachers and they are sensitive to growth over short periods of time (i.e., 1 month). EMERGE teachers receive training and on-site coaching to administer and use the information obtained from progress-monitoring procedures (see the Professional Development section).

Three IGDIs (described in the following) are administered individually to children by classroom teachers or aides at 1-month intervals, during the third week of every month. Progress monitoring occurs during times of the day that are routinely scheduled for learning centers. During the morning or afternoon center time, children rotate individually through the progress-monitoring center. The administration of the IGDIs requires 6 to 8 minutes per child. Thus, EMERGE teachers report they are able to complete all progress monitoring for children within a 4-day period.

The three IGDIs that comprise the progress-monitoring measures are Picture Naming, Rhyming, and Alliteration (Early Childhood Research Institute on Measuring Growth and Development, 1998). For Picture Naming,

children are shown pictures of objects on individual cards and given 1 minute to name as many pictures as possible. For Rhyming, children have 2 minutes to view individual cards each with a stimulus picture (e.g., car) and three response-choice pictures (e.g., house, star, dog). For each card, children point to the response-choice picture that rhymes with the stimulus picture. The format for Alliteration is similar to the rhyming task, except that children point to the response-choice picture that starts with the same sound as the stimulus picture. In addition to these three IGDIs, progress monitoring includes the Alphabet Knowledge subtest of the PALS-PreK.

Monthly progress-monitoring data are used to identify the lowest performing 50% of children for Tier 2 small-group instruction. Teachers receive a graphic summary of both individual child data and aggregated classroom data (average scores) prepared by EMERGE staff. Teachers use this information, first, to make decisions about homogeneous Tier 2 small-group formation. Children (4–6) in the lowest 25% of the class comprise one small group, and children (4–6) in the next highest 25% comprise another small group. The decision to provide 50% of EMERGE children with Tier 2 instruction (vs. 10%–25% who are estimated to require Tier 2 interventions in most RTI models) was based on several factors. First, using this decision rule allows teachers to maximize the support provided to high-risk preschoolers through small-group instruction. Second, the decision rule is applied to performance across all progress-monitoring measures. Thus, if a child is in the lowest 25% on Rhyming and the lowest 35% on Alphabet Knowledge, he or she will receive Tier 2 instruction. Finally, daily attendance typically varies among Head Start children. Using this decision rule ensures that small groups include at least 3 children every day.

High-Quality Literacy-Rich Environments

This third program component focuses on the design and structure of classroom environments to promote the development of children's language and literacy. Children's literacy skills and behaviors are strongly influenced by features of the environment, including the arrangement of learning centers, availability of materials for reading and writing, and displays of print around the room. Effective literacy environments are characterized by three features (Dickinson & Sprague, 2001; Makin, 2003). First, materials are available and space is organized to facilitate frequent engagement in meaningful literacy activities. For example, literacy-rich classrooms

surround children with accessible, high-quality books; diverse writing materials; and models of language and print (e.g., labels, signs, posters, displays of children's writing, etc.). Second, within literacy-rich environments, teachers function as active facilitators of children's language and literacy. They establish positive, nurturing relationships with children; encourage children to express themselves; model reading and writing behaviors; talk about environmental print in the classroom and community; embed new vocabulary into conversations; and promote oral language in social or play contexts (Massey, 2004). Third, high-quality environments provide frequent and sustained opportunities to engage in literacy and language activities, especially through literacy-enriched play. Through literacy play, there is a deliberate integration of thematic literacy props into play settings, combined with adult mediation and scaffolding of children's interactions with props (Justice & Pullen, 2003; Neuman & Roskos, 1993). In addition, diverse literacy materials (books, writing tools, alphabet display, etc.) are available in activity centers around the room (e.g., math, science, drama, construction, etc.) to promote the integration of literacy with other developmental domains.

In the EMERGE program, these features of high-quality literacy environments are evaluated through systematic classroom observations conducted by trained observers using the *Early Language and Literacy Classroom Observation* (ELLCO) system (Smith & Dickinson, 2002). ELLCO includes an evaluation of each environmental feature and provides a summary of the overall quality of a classroom in relation to early literacy skill development. Available research indicates acceptable construct validity and interrater reliability for the ELLCO, as well as utility for measuring environmental changes across time (Smith & Dickinson, 2002). ELLCO yields a total maximum score of 70 distributed across three parts: (a) the Literacy Environment Checklist (LEC), (b) one 40-minute classroom observation and follow-up teacher interview, and (c) the Literacy Activities Rating Scale (LARS). The LEC focuses on classroom organization and literacy materials. It consists of 24 items that are scored using either a yes–no format (e.g., "Is an area set aside just for book reading?") or a rating indicating the number of literacy materials available (e.g., "How many varieties of teacher dictation are on display in the classroom?"). The classroom observation occurs continuously over a 40-minute period of time during which there is a teacher-directed focus on literacy activities. Observers note and rate the frequency and quality of language- and literacy-related teacher interactions and behaviors. Finally, the LARS includes items related to book-reading and writing activities in the classroom throughout the day.

A summary of beginning-of-year observations (conducted in September) with specific guidelines and criteria for strengthening classroom environments is provided to teachers during the professional development and coaching sessions in October. In 2005–2006, the average total ELLCO score for EMERGE teachers in September was 47.18 (SD = 7.47). End-of-year observations (May) yielded an average total ELLCO score of 63.44 (SD = 4.11), reflecting significant improvement in the quality of environments, $t(14)$ = 7.59, p < .001, and reduction in the overall variability of quality across classrooms.

Professional Development

The final component of EMERGE is teacher professional development. Teachers' knowledge and use of scientifically based classroom practices are central to the implementation of an RTI model. The EMERGE professional development component is designed to improve teachers' understanding of language and literacy and their application of evidence-based practices. This is achieved through two types of professional development activities. First, EMERGE teachers participate in monthly 3-hour professional development training sessions (presented by the program directors) to acquire the skills and resources necessary for (a) implementing Tier 1 instructional elements (SECP curriculum, SOAP strategies, and SBR), (b) conducting monthly progress monitoring, (c) using information about children's early literacy performance to alter Tier 1 instruction and/or to plan Tier 2 small-group instruction for identified children, and (d) designing high-quality literacy environments. The professional development sessions are designed to combine didactic training (guided by the content and strategies of the SECP and other EMERGE manuals described previously) with collaborative planning among teachers and whole-group sharing of successful classroom practices. Opportunities are provided during each professional development session for classroom teams (teacher and aide) to collaborate with the program directors and/or other teams to address challenges in implementing Tier 1 and Tier 2 instruction. In addition, teacher teams are encouraged to showcase activities found to be particularly effective in their classrooms.

The second type of professional development involves on-site early literacy coaching and mentoring and collaborative planning with the literacy coach for 2 hours every week (per classroom). The EMERGE literacy coach has an advanced degree in early childhood education and certification as an early literacy coach. The objectives of literacy coaching are to model strategies;

work one-on-one with teachers and children; monitor implementation integrity through observations; and provide scaffolded, individualized support for teachers.

Preliminary Evaluation of EMERGE

An initial evaluation of the EMERGE program was completed in August 2006 following 1 year of implementation in 15 classrooms. Preliminary comparisons of children's performances on key outcome measures in EMERGE classrooms versus control classrooms suggest that the multitiered, scientifically based instruction of EMERGE is associated with higher performance across multiple indicators of early literacy and language development.

To conduct the program evaluation, 10 SDC Head Start classrooms were randomly selected to serve as a control group. Similar to EMERGE classrooms, 90% of the children in control classrooms were from families that meet income guidelines for the federal poverty level. In addition, 92% of children were African American, 7% were of Hispanic origin, and 1% were White/Other. All teachers in EMERGE and control classrooms were women (with the exception of one male classroom aide in an EMERGE classroom). Table 1 summarizes additional characteristics of EMERGE and control classroom teachers.

The beginning-of-year (September) and end-of-year (May) performance of children in EMERGE and control classrooms is summarized in Table 2 on eight outcome measures: IGDI Rhyming, Alliteration, and Picture Naming; story-retelling task; PPVT-III; and uppercase letter knowledge, print and word awareness, and name writing from the PALS-PreK. It is important to note that these performance data are aggregated across all ages, including 5-year-old children who entered kindergarten in Fall 2006 and 3- and 4-year-old children with 1 or 2 more years of preschool experience (including EMERGE) before starting kindergarten.

As shown in Table 2, each measure exhibited moderate correlations with the other outcome measures. As expected, the correlation between PPVT-III and Picture Naming (both measures of oral vocabulary) was strong ($r = .51$), as was the correlation between Rhyming and Alliteration ($r = .59$), which are both measures of phonological, or sound, awareness. Multiple analyses of covariance were conducted to examine differences between children in EMERGE and those in control classrooms on each outcome measure at the end of the year (May), covarying for beginning-of-year (September) performance. On each measure, EMERGE children outperformed

Table 1
Characteristics of Teachers in Exemplary Model of Early Reading Growth and Excellence (EMERGE) and Control Classrooms

Teacher Characteristics	EMERGE ($n = 30$)		Control ($n = 20$)	
	n	$\%$	n	$\%$
Gender				
Female	29	97	20	100
Male	1	3	0	0
Race/ethnicity				
African American	18	60	11	55
Hispanic	3	10	3	15
White	8	27	4	20
Asian/other	1	3	2	10
Highest degree				
Bachelor's	13	43	8	40
Associate's	11	37	8	40
High school	6	20	4	20
Total years of experience				
1–5	0	0	3	15
6–10	8	27	8	40
11–15	10	33	4	20
16–20	6	20	2	10
20+	6	20	3	15
Years in current position				
1–5	9	30	6	30
6–10	7	23	8	40
11–15	8	27	3	15
16–20	6	17	2	10
20+	1	3	1	5

children in the control classrooms. Effect sizes ranged from .13 to .45.

Conclusion

EMERGE is an early literacy program designed to provide multitiered, scientifically based instruction to low-income children to ensure they begin kindergarten with the fundamental skills necessary for learning to read. Conceptualized within an RTI framework, EMERGE relies on monthly progress-monitoring data and ongoing observations by trained teachers to provide whole-group instruction, small-group support, and individualized tutoring for children to promote their early literacy and language development. Through EMERGE, early identification of children who do not respond to Tier 1 instruction, combined with the provision of literacy-rich environments and evidence-based instruction across all intervention tiers, contributed to higher performance on multiple early literacy and language indicators compared to children in comparable Head Start classrooms.

Table 2
Beginning and End-of-Year Performance on Literacy Measures for Exemplary Model of
Early Reading Growth and Excellence (EMERGE) and Control Children

Outcome Measure[a]	EMERGE ($n = 188$)[b]		Control ($n = 154$)[b]		F Value[c]
	September	May	September	May	
Peabody Picture Vocabulary Test–III	84.20	90.42	81.85	84.97	229.43
($r = .30–.56$)	(12.96)	(11.51)	(14.98)	(17.25)	$p < .001$, $\eta^2 = .45$
Alphabet Knowledge	5.63	14.89	3.04	8.36	205.40
($r = .27–.55$)	(7.69)	(7.47)	(5.70)	(8.43)	$p < .001$, $\eta^2 = .44$
Alliteration	3.42	5.05	3.20	4.00	13.42
($r = .29–.59$)	(2.15)	(2.06)	(2.67)	(2.55)	$p < .001$, $\eta^2 = .22$
Rhyming	3.86	7.39	3.59	5.94	8.30
($r = .24–.59$)	(3.90)	(3.73)	(2.88)	(4.42)	$p < .006$, $\eta^2 = .13$
Story Retelling	2.09	3.43	1.92	2.36	80.99
($r = .39–.50$)	(2.26)	(1.41)	(2.51)	(2.30)	$p < .001$, $\eta^2 = .34$
Picture Naming	14.09	20.34	13.64	15.66	65.74
($r = .36–.51$)	(6.15)	(5.87)	(6.70)	(6.75)	$p < .001$, $\eta^2 = .20$
Print Awareness	3.30	5.41	3.22	4.02	39.56
($r = .30–.56$)	(2.34)	(2.04)	(2.36)	(2.63)	$p < .001$, $\eta^2 = .28$
Name Writing	2.54	4.35	2.17	3.95	33.84
($r = .24–.55$)	(2.83)	(2.06)	(1.87)	(2.08)	$p < .001$, $\eta^2 = .27$

a. *r* indicates correlations with other measures.
b. The number of children varied slightly for each measure because of absences on the days of testing. When children were absent, test scores were entered as missing data.
c. EMERGE versus control group differences in May, covarying for September performance.

Although early childhood services based on RTI are similar to school-age models, there are important differences in both the application and evaluation of an RTI model for early intervention. Consistent with an RTI approach, the foundation for EMERGE is universal implementation of Tier 1 instruction that provides literacy-rich classroom environments and scientifically based early literacy practices for all children. The intervention tiers of EMERGE incorporate a stronger focus and practice with early literacy skills for small groups of selected children who fall below peers based on progress-monitoring data (Tier 2) and/or for individual children who evidence significant delays based on screening and assessment measures (Tier 3). One difference between RTI for school-age children and EMERGE relates to the content and strategies for Tier 2 and Tier 3 instruction. In elementary and secondary schools, there is often lack of consensus about the precise nature of Tier 2 and Tier 3 interventions (Fuchs & Fuchs, 2006). Most often, however, multiple tiers are associated with interventions that are different

from Tier 1 or universal intervention. By contrast, in the EMERGE program, all intervention tiers are structured around a common core set of fundamental early literacy skills (referred to as SOAP skills) for which there is fairly strong consensus about their importance for later reading success. Thus, rather than differentiating tiers on the basis of the content or focus of specialized interventions, what varies is the degree of explicit and individualized emphasis on SOAP skills.

Against this backdrop of uniformity in skills and abilities that are critical for promoting early literacy development is a philosophy of education that characterizes early intervention, specifically, the importance of developmental appropriateness. Early childhood is a period of sporadic, variable, and highly individual growth and development. The practice guidelines and recommended practices of professional organizations, such as the National Association for the Education of Young Children and the Division of Early Childhood, reflect this philosophy and emphasize the need for early education to be responsive

to children's developmental needs. When implementing RTI with young children, a challenge arises when attempting to apply uniform decision rules to determine movement between intervention tiers. Operationalizing the decision-making process, especially for Tier 2 intervention, is problematic. In EMERGE, determining the need for Tier 2 instruction blends teachers' knowledge of children's progress gained through observations during everyday Tier 1 learning experiences with more standardized performance data acquired through monthly progress monitoring. Teachers are encouraged to incorporate their own impressions about how children are responding to Tier 1 instruction in determining the need for Tier 2 small-group instruction. Equally important in this decision-making process is collaboration and consultation with the early literacy coach who monitors the implementation of Tier 1 instruction and environments as well as children's performances. In effect, movement between intervention tiers in EMERGE is a more flexible and dynamic process than what characterizes RTI with older children. This flexibility, while responsive to the changing developmental needs of young children, poses a challenge to researchers in attempting to systematically evaluate the tiered components of an RTI model. For example, because movement between Tier 1 and Tier

2 is frequent (at least monthly), it is difficult to create a comparison group of children who are at equivalent skill levels. An effective RTI approach should reduce variance in children's performances; therefore, children may move in and out of the lowest performing groups frequently. Although comparison between EMERGE and control classrooms on outcome measures is possible, it is more difficult to extract a comparison group for children who receive Tier 2 and Tier 3 intervention. In EMERGE, we aim to conduct more frequent assessment of control children in the next 2 years to be able to make these appropriate comparisons.

In sum, the use of an RTI model with young children is consistent with the increasing emphasis on early intervention and scientifically based early literacy instruction. The ongoing development of appropriate progress-monitoring tools for young children, such as the IGDIs, and the growing evidence base identifying important early literacy skills have supported the development and utility of an RTI model for early childhood education. As demonstrated through the development and implementation of EMERGE, there are significant benefits to an RTI approach for promoting early literacy development and long-term reading success among low-income, high-risk preschool children.

Appendix A
Shared Book Reading Activity Card

Farm Flu
By Teresa Bateman. Illustrated by Nadine Bernard Westcott

Sound Awareness	• Choose 2-3 pages and read them several times. First, model by emphasizing the rhymes (e.g., *well* and *spell*). Next, let the child fill in the blank (e.g., leave out the word *spell*). • Help children play with sounds by thinking of other words to complete rhymes in the book. • Tell the child that the sentences in the story are made up of different words. Have the child count the number of words on various pages.
Oral Language	• Look at the pictures together and talk about all the different kinds of farm animals. Ask children what sound each animal makes, or have them imitate the movements of each animal. • Talk about what it would be like to work as a farmer. Ask: What do you think a farmer does all day? Would you like to be a farmer?

Alphabet Knowledge	- Ask the child to find all the upper- and lowercase *O*s (or any other letter) on each page. - Ask the child to notice how the words *cow* and *plow* look the same near the end. You can cover up the first letters to make this more apparent. - With other rhyming words, ask the child to find (point to) the letters that are the same in the pairs of words and to name (identify) the letters.
Print Awareness	- Ask where to begin reading and have them point to each word as you read it. - Point out the word *flu* the first time you see it and have the child "read" it every time it occurs in the text. - Talk about the different parts of the book and where each is located (e.g., author, illustrator, page numbers, words).
Vocabulary	*guernsey*: cow that gives milk. They came from an island called Guernsey, which is near France. *recuperate*: get better after being sick. Ask about a time when children were sick. *miracle*: something amazing that happens. It was a miracle that the animals suddenly got better. Ask: Has something amazing ever happened to you?

Text	Teacher-Child Interactions
Preview	- Page through the book and talk about the different types of animals. Their names can then be reviewed as you read. - Ask children to predict what the book will be about. Encourage them to look at the pictures and talk about what the farm animals are doing.
Pages 1-2	- Ask: Where should I start to read on this page? [Allow response.] Say: I'm going to start reading right here, and I'm going to go this way. - Say: Let's make up a sentence about farms using only words that start with the letter *F*. (Farm friends frolic for fun.) - Point to the picture of the farm. Ask: Where is the /f/ sound in farm? Is it at the beginning or the end of the word?
Pages 5-6	- Say a pair of words that rhyme (*cow* and *plow*) and pairs that don't rhyme (*flu* and *milk*). Ask the child to pick out the words that rhyme. - Say a pair of words that start with the same letter (*milk* and *mom*) and a pair that doesn't start with the same letter (*flu* and *cow*). Ask the child to pick the words that start with the same letter.
Pages 9-10	- Ask: Have you seen a chicken before? Where? Did you know that chickens lay eggs? Do you eat eggs? - Say: Listen to these words: *cock-a-doodle-doo* and *ka-choo*. Can you hear how they sound the same at the end? They rhyme. Other words sound like that, too. Let's think of some (*boo*, *new*, *dew*, *few*, *moo*, *kangaroo*, *too*).

Pages 13-14	• Look at these two words: *piglets* and *tub*. Which one is longer? How would we check? (Count the letters.) • Let's play say it slow, say it fast. I'm going to say *tub* really slowly and you say it back to me fast. Now let's switch. Let's try it with *rub*. • Let's clap the word *turkey*. How many beats or syllables do you think it has? Let's try it. Do you think *turkey* has more or fewer beats than *tub*? Let's find out!
Pages 17-18	• Listen to these words: *wild*, *wooly*. They start with a /w/ sound. Can you think of any other words that also start with a *W*? (*water*, *work*). • What sound do sheep make? Can you make the sound? • What does your mom do when you have the flu? What does it look like this boy is doing?
Pages 20-21	• What animal makes each of these sounds? • I see two words on this page that start with the letter *S*. Can you find them? Let's say them together. Can you think of any other animals that start with the letter *S*? (*snake*, *skunk*, *shark*, *spider*, *stegosaurus*, *swan*, *squirrel*). What noises do those animals make?

Appendix B
Tier 2 Theme-Related Small-Group Activity

Theme VI: Staying Well	
Activity: It's in the Bag!	**Week 2:** 2/19–2/23
Topic of Week: nutrition and exercise	**Focus Letters:** Vv (vegetable), Ee (exercise)

Purpose of activity:
To focus on alphabet knowledge and alliteration by matching food items to the letter they begin with.

Primary SOAP skill: × **Sound Awareness**
Oral Language and Vocabulary

× **Alphabet Knowledge**
Print Awareness

Materials needed for the activity:
• brown lunch bags with a letter printed on both sides
• foods (or food containers) that begin with the letters printed on the bags
• basket to hold food items

Steps for the teacher to prepare and implement the activity:
1. Collect foods that begin with various letters, including 3 to 5 pairs of items that start with the same letter (e.g., *popcorn* and *peach*). Label the food items.
2. Label each bag with the beginning letters of foods.
3. Place the food in the basket and line up the bags so children can see the letters on the bags.
4. Tell children to select one food item, name the food, identify the first letter, say the sound of the first letter (if able to do so), and place it in the bag with the letter.

Variations or additions:
- Use this activity to focus on alliteration. When there are two foods that start with the same letter (and sound), take them out of the bag. Emphasize that the two foods start with the same sound (e.g., *popcorn* and *peach*).
- Take a food out of a different letter bag (e.g., *carrot*). Say all three foods (e.g., *popcorn*, *peach*, *carrot*) and ask children to say the two foods that start with the same sound.

Math and science connections:
- Count the number of foods in each bag. Determine which letter bag has the most, which has the least. Graph results.
- Talk about the different types of food groups—vegetables, dairy, grains, etc.

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