Preschool Instruction and Children’s Emergent Literacy Growth

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Preschoolers’ \( N = 156 \) classroom language and literacy experiences, defined across multiple dimensions, and their vocabulary and emergent literacy development were investigated. Videotaped classroom observations revealed substantial variability in amount and types of language and emergent literacy activities, across classrooms and for individual children within classrooms. Generally, more time in emergent code-focused activities was associated with preschoolers’ alphabet and letter-word recognition growth, whereas more time in meaning-focused activities (e.g., book reading) was related to vocabulary growth. Only teacher- and teacher–child-managed activities were associated with alphabet and letter-word growth, whereas child-managed experiences, including play, were also associated with vocabulary growth. Overall, the effect size for student-level, code-focused instruction (small group) was about 10 times greater than was its classroom-level (whole-class) counterpart. There were Child \( \times \) Instruction interactions, with the impact of different activities varying with preschoolers’ incoming vocabulary and emergent literacy.

Keywords: prekindergarten, language development, reading, early childhood development

Accumulating evidence reveals that high-quality preschool experiences may lead to stronger student academic outcomes, especially for children at risk for academic underachievement (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Conyers, Reynolds, & Ou, 2003; Graue, Clements, Reynolds, & Niles, 2004; Nelson, Benner, & Gonzalez, 2003; Reynolds & Ou, 2004; Reynolds, Ou, & Topitzes, 2004; Reynolds, Temple, Robertson, & Mann, 2003). This finding is important because in the United States, fully one third of children fail to read at basic levels by fourth grade (National Assessment of Educational Progress, 2003, 2005), and the percentage is higher for children living in poverty or who belong to certain ethnic minorities. High-quality preschool interventions have been shown to reduce referral to special education and to enhance overall educational attainment (Barnett, 1995; Conyers et al., 2003; Nelson et al., 2003; Reynolds & Ou, 2004; Reynolds et al., 2004). However, there is substantial variability in classroom practices and resulting child outcomes across programs and studies (Barnett, 1995; Nelson et al., 2003), and research seeks to understand how specific types of preschool classroom experiences relate to child outcomes. Teachers’ sensitivity and responsiveness (National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network [ECCRN] studies), their use of cognitively challenging talk and rare words (e.g., Dickinson & Tabors, 2001), and their styles of book reading including dialogic reading (Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994) as well as child-initiated practices (Schweinhart & Weikart, 1988), for example, are related to positive child outcomes, and these findings have been consistent in multiple settings (Conyers et al., 2003; NICHD ECCRN, 2002). Generally, there is less research and evidence that a focus on academic skills provides consistently stronger child outcomes (Graue et al., 2004; Stipek et al., 1998; Stipek, Feiler, Daniels, & Milburn, 1995). Yet attention to the content of and amount of time spent in specific preschool emergent literacy activities and the relation of these activities to preschoolers’ emergent literacy development may be important, especially with the inauguration of new universal prekindergarten initiatives and the recent findings regarding Head Start efficacy (U.S. Department of Health and Human Services, 2005).

The purpose of this study was to closely examine the language, emergent literacy, and other learning experiences that are provided to preschoolers and to investigate the contribution of these experiences to students’ language and emergent literacy skill development. It is generally agreed that emergent literacy “involves the skills, knowledge, and attitudes that are developmental precursors to conventional forms of reading and writing. These skills are the basic building blocks for how students learn to read and write” (Connor & Tiedemann, 2005, p. 1). An emergent literacy perspec-
tive departs from a reading readiness model. In the readiness model, learning to read begins with formal school-based reading instruction. From an emergent literacy perspective, there is no boundary between what is considered to be the conventional reading that students learn in school and everything that comes before. Rather, the emergent literacy perspective views literacy-related behaviors that occur in the preschool period as legitimate and important features on a developmental continuum of literacy (Bowman, Donovan, & Burns, 2001; Shonkoff & Phillips, 2000; Teale & Sulzby, 1986).

Short- and Long-Term Benefits of Preschool Intervention

Research on preschool interventions has revealed short-term and long-term social and cognitive gains for students who may experience academic underachievement because of poverty, disabilities, and other risk factors. Documented advantages include reduced referral to special education, reduced grade retention, higher rates of high school graduation, and reduced levels of juvenile delinquency (Barnett, 1995; Barnett, Young, & Schweinhart, 1998; Bryant, Peisner-Feinberg, & Clifford, 1993; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; Campbell et al., 2001; Dickinson & Smith, 1994; Durlak, 2003; Lazar, Darlington, Murray, Roche, & Snapper, 1982; Morrison, Bachman, & Connor, 2005; see also Nelson et al., 2003; Peisner-Feinberg & Burchinal, 1997).

Perhaps the most compelling long-term positive outcomes come from research on model programs like the High Scope/Perry Preschool project, the Abecedarian project, and the Chicago Child–Parent Centers (or Chicago Title I Project; Barnett, 1995). These studies, initiated 20 or more years ago, each independently provide evidence of short- and long-term benefit to their participants relative to a control group of students. Most recently, for example, the Chicago Child–Parent Centers calculated that for every dollar spent on the preschool intervention, society realized a $7.14 return in saved education and societal costs from reduced referral to special education, reduced grade retention, and reduced juvenile delinquency (Reynolds, Temple, & Ou, 2003; Reynolds, Teacher, Robertson, & Mann, 2003).

Still, in light of society’s substantial investment in public preschool programs, such as Head Start, Early Reading First, Title I, and universal preschool, as Reynolds and colleagues noted (2004), “greater attention to how the long-term effects come about is needed to inform program improvement and expansion efforts” (p. 1301). Accumulating evidence indicates that children’s early language and literacy experiences in the classroom make an important contribution to the long-term effects. Studies, such as the NICHD Study of Early Child Care and Youth Development (e.g., NICHD ECCRN, 2002), Harvard Home-School Study (Dickinson & Tabors, 2001; Smith & Dickinson, 1994), intervention studies (Torgeson et al., 2001; Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994), and others (Nelson et al., 2003) have clearly revealed that cognitively challenging talk (Dickinson & Tabors, 2001; Smith & Dickinson, 1994), exposure to rare words (Beals & Tabors, 1995; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002), shared book reading, reading to students using dialogic reading techniques (Cook-Gumperz, 1986; Crain-Thoreson & Dale, 1999; Dickinson & Tabors, 2001; Lonigan & Whitehurst, 1998; Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994), play (Pellegrini & Galda, 1993), and use of playful activities to stimulate learning (Bowman et al., 2001; Howes & Smith, 1995; Roskos & Christie, 2000) all enhanced children’s language and early reading skills.

Virtual none of these studies, however, focused on the explicit instruction of emergent literacy in preschool. (Graue et al., 2004), and the published findings are mixed. For example, preschoolers in programs that provided explicit instruction in basic reading skills showed stronger skills but less positive feelings about themselves and less motivation than did students in child-centered programs, which encouraged children’s learning through play (Stipek et al., 1995). In still another study, preschoolers in classrooms that focused on basic skills demonstrated weaker cognitive and motivation outcomes than did preschoolers in classrooms that de-emphasized basics skills and had more positive social climates (Stipek et al., 1998). However, these studies tended to pit one kind of curriculum against the other, which may oversimplify the complex effects of classroom experiences on students’ outcomes. New evidence, using teacher report, suggests that curricula that were high in teacher-directed instruction with specific content and simultaneously high in child-initiated, teacher-responsive approaches yielded more positive short- and long-term educational and social outcomes for preschoolers than did programs that emphasized one over the other or neither (Graue et al., 2004). Hence, using two or more dimensions of instruction coupled with direct observation of preschool classroom language and literacy activities may yield a more nuanced view of preschool experiences and their effect on students’ outcomes.

Dimensions of Instruction

One challenge facing researchers is how to capture the complexities of preschoolers’ classroom experiences while also permitting statistical analysis of the effects of these experiences on student outcomes. Much of preschool research has compared the relative effectiveness of three curriculum types based on different theories of learning (Bowman et al., 2001, pp. 138–139): (a) direct instruction, in which the teacher uses drill and practice lessons that teach specific skills incrementally; (b) traditional approaches, which assume that children will learn when they are ready as long as stimulating environments are provided; and (c) cognitive curriculum, in which learning is viewed as an active exchange between children and their environment, which includes the teacher. However, during any given school day, teachers may provide a variety of experiences that transcend all three of these major curriculum types. The teacher may use direct instruction for teaching letters but a cognitive curriculum approach during sharing time and more traditional approaches as she or he sets up the dramatic play center. Comparing one curriculum with another may overlook the complexity of learning activities preschoolers actually experience in their classroom. Thus, for this study, we sought to examine the content or focus of the learning experiences, using multiple dimensions, rather than the type of curriculum being utilized.

Additionally, accumulating evidence indicates that emergent literacy is a multidimensional construct (Senechal, 2006; Senechal & LeFevre, 2001) rather than a more global construct as originally proposed by Teale and Sulzby (1986). As Senechal and LeFevre (2001) observed, there is striking evidence that emergent literacy is distinct from oral language and metalinguistic awareness (Ma-
son & Stewart, 1990; Whitehurst & Lonigan, 1998). Different components of the home literacy environment—formal versus informal emergent literacy experiences—differentially predict the distinct components of emergent literacy (Senechal & LeFevre, 2002; Senechal, LeFevre, Thomas, & Daley, 1998). Using a parallel argument, we contend that if emergent literacy has multiple dimensions, then examining sources of classroom instruction’s influence multidimensionally should prove more informative than examining the impact of instruction more globally. Thus, we examined the content of classroom literacy activities across four dimensions: teacher managed (TM) versus teacher–child managed (TCM) versus child managed (CM), code focused versus meaning focused, explicit versus implicit, and student- versus classroom-level instruction. Each dimension is discussed below.

**TM Versus TCM Versus CM**

The dimension TM versus TCM versus CM considers who is focusing the child’s attention—the teacher or the student (Connor, Morrison, & Katch, 2004; Connor, Morrison, & Petrella, 2004; Morrison et al., 2005) or whether the attention is jointly focused (teacher and students interacting). This dimension may be confused with teacher-directed and child-centered (Bowman et al., 2001, chap. 5) or child-initiated learning (Schweinhart & Weikart, 1988), but it is substantially different. In the framework used in this study, child-centered or child-initiated learning may be TM or CM or managed jointly: TCM. What is at issue is who is directing the child’s attention, the teacher and/or the child. A teacher reading a book to students without discussion, even if the children selected the book, would be considered TM because the teacher is focusing the children’s attention and is doing most of the talking. Sharing, scaffolding, or interactive read-alouds are considered to be TCM within this framework because the teacher is actively involved with and responsive to the child. There is good evidence that warmer and more responsive teacher–child interactions are associated with stronger student outcomes (Connor, Son, Hindman, & Morrison, 2005; Graue et al., 2004).

In contrast, activities in which the child is working independently or with peers, such as completing worksheets and pretending reading alone or with a friend in the library corner, are considered CM because the student is directing his or her own attention without the support of the teacher. Peer interactions are considered CM because students, not teachers, are supporting each other’s learning. There is evidence that such peer-managed activities are substantially different from TM activities (Palincsar, Collins, Mamrano, & Magnusson, 2000).

**Code-Focused Versus Meaning-Focused Activities**

The code-focused versus meaning-focused dimension captures the content focus of language and emergent literacy activities. Although clearly preschoolers are not taught to read as such, there is evidence that appropriate preschool activities can enhance their emergent literacy—including letter knowledge and phonological awareness. These kinds of activities may be considered emergent code-focused activities (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). These would include teaching children how to name and write letters, to rhyme words (Torgesen, Burgess, Wagner, & Rashotte, 1994; Torgesen et al., 1999), to relate letters to the sounds they make, and to sound out words (phonological decoding). In the preschool literature, many of these activities would be associated with curricula that focus on basic skills (Graue et al., 2004; Stipek et al., 1995) or direct instruction (Schweinhart & Weikart, 1988).

In contrast, activities designed to help students understand words and passages, comprehend what is read to them or what they are reading, and enhance receptive and expressive language skills including listening comprehension, which support emerging reading comprehension (Scarborough, 1990), may be considered meaning-focused activities (Dahl & Ffrepon, 1995; Foorman et al., 1998; Juel & Minden-Cupp, 2000). Such activities include explaining the meaning of a word (i.e., vocabulary activities), (National Reading Panel, 2000), reading aloud to children (Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994), discussion and sharing (Snow, 2001), and children’s emergent reading and writing activities (National Reading Panel, 2000; Sulzby, 1985).

**Explicit Versus Implicit**

The dimension explicit versus implicit speaks to the specificity of learning (Senechal, 2006; Senechal & LeFevre, 2001, 2002; Senechal et al., 1998) and incorporates the idea that activities can be explicitly or implicitly focused on promoting a specific outcome; in this study, either language or emergent literacy. This dimension is defined depending on the outcome being explored. So, for example, if the outcome is language or vocabulary, activities that directly focus on language development (e.g., reading to children; Senechal & LeFevre, 2002) would be considered explicit language activities. If the outcome is learning letters and phonological decoding, then activities that focus on these outcomes (e.g., rhyming games) would be explicit emergent literacy or emergent decoding activities. However, children may learn letters and letter sounds indirectly through activities like shared storybook reading. Thus, reading to children would be an implicit emergent literacy activity, although it is an explicit language activity. This dimension is similar to the formal versus informal framework presented by Senechal and LeFevre (2002), in which parents explicitly teaching their children letters is considered formal literacy exposure, whereas parents reading to children is considered informal literacy exposure.

Play (e.g., child-selected activities such as dramatic play, building blocks, etc.) is implicit for both emergent literacy and language outcomes because children are focusing on having fun (e.g., when they pretend to write birthday party invitations) rather than, for example, learning letters. Researchers might expect such implicit activities to impact children’s emergent literacy and language, although they do not specifically target skills associated with emergent literacy or language (Bowman et al., 2001; Pelligrini & Galda, 1993; Rowe, 1988). Note that within our coding system, play has a precise definition and is distinct from games, fine and gross motor activities, art, and music, which each have their own codes (see Appendix A). Math, science, or social studies activities, although coded, are beyond the scope of this study, although one might argue that focus on these content areas might implicitly contribute to children’s vocabulary development, for example.
Future studies will focus on the role of these activities in preschool.

**Classroom Level Versus Student Level**

The dimension classroom level versus student level considers the extent to which instruction is the same or different for each student in the classroom. Language and literacy activities may be classroom level, such as when the teacher is reading aloud during circle time. All of the students are doing substantially the same thing at the same time. Even if the students are working in small groups or individually, if they are all doing substantially the same thing (e.g., play), then that is classroom-level instruction.

In contrast, for student-level instruction, students in one classroom are engaged in substantially different activities at the same time. Teachers may provide student-level instruction in small groups or they may work with children individually (e.g., centers with different activities, tutoring one child while the rest do other activities). The video coding system permits coding of individual student participation in specific activities so that researchers can examine this dimension of instruction.

Note that specific types of activities can be the same across the classroom-level versus student-level dimension. Teachers can read aloud to the entire class (TM—meaning focused—classroom level) or can read aloud to a small group of children while the rest of the children engage in substantially different activities (TM—meaning focused—student level).

**Putting the Dimensions Together**

A key feature of these dimensions is that they are operating simultaneously. Thus, activities fall in sectors for classroom-level activities and student-level activities with, potentially, 12 combinations in all (see Table 1).

Because our coding system was designed to capture the content of the activities observed rather than the motivator (teacher or child), we did not focus specifically on teacher-directed versus child-initiated, teacher-responsive instruction (Bowman et al.,

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<th>Dimension</th>
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<th>Teacher-child managed (TCM)</th>
<th>Child managed (CM)</th>
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<td>Classroom-level instruction</td>
<td>CF–cl</td>
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<td>Spelling</td>
<td>Phonological awareness</td>
<td>Initial consonant stripping</td>
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<td>Alphabet activity</td>
<td>Letter–sound correspondence</td>
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<td>Implicit decoding, code focused or explicit language–vocabulary, meaning focused</td>
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<td>Teacher read-aloud</td>
<td>Teacher read-aloud–discussion combined</td>
<td>Sustained silent reading</td>
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<th>Dimension</th>
<th>Teacher managed (TM)</th>
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<tr>
<td>Student-level instruction</td>
<td>CF–st</td>
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<td>Alphabet activity</td>
<td>Handwriting practice</td>
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<td>Implicit decoding, code focused or explicit language–vocabulary, meaning focused</td>
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<td>Teacher read-aloud–discussion combined</td>
<td>Writing (invented spelling)</td>
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<td>Discussion</td>
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<td>Conventions of print</td>
<td>Sustained silent reading</td>
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<td>Scaffolded sustained silent reading</td>
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**Note.** CM–MF–st and CM–MF–st play are summed to create the CM implicit-decoding variable. MF = meaning focused; CF = code focused; st = student level; cl = classroom level.
2001, chap. 5). We did record the activities such approaches might generate, however, using our other dimensions (explicit vs. implicit; TCM vs. CM). Thus, we do not distinguish between teacher read-aloud activities initiated by the child (the child asks the teacher to read the book or the teacher notices that Demario [pseudonym] is interested in fish and selects a book on that topic) or by the teacher (the teacher selects the book and reads it to the children). We do capture how interactive the read-aloud was by distinguishing teacher read-aloud and teacher read-aloud with discussion, for example.

Child Characteristics

Accumulating evidence reveals a number of child literacy skills in preschool and kindergarten that consistently predict later reading and academic success, including alphabet knowledge, phonological awareness, letter–word recognition, and phonological decoding (NICHD ECCRN, 2005; Poe, Burchinal, & Roberts, 2004; Rayner et al., 2001; Scarborough, 1998; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004; Snow, Burns, & Griffin, 1998). Language skills, particularly vocabulary, also appear to be consistent predictors of later reading success, especially as comprehension of what is read becomes important (Anderson & Freebody, 1981; Loban, 1976; National Reading Panel, 2000; NICHD ECCRN, 2005; Poe et al., 2004; Scarborough, 1990, 2001; Snow et al., 1998; Storch & Whitehurst, 2002). In contrast to early decoding skills, research reveals that growth in vocabulary skills may be highly stable and resistant to intervention and the effect of schooling (Hart & Risley, 1995; Morrison, Smith, & Dow-Ehrenberger, 1995). There is evidence, however, that rich literacy (meaning-focused) experiences at home (Beals & DeTemple, 1993; Senechal et al., 1998), during storybook reading (Robbins & Ehri, 1994), and in preschool (Dickinson, Anastasopoulous, McCabe, Peisner-Feinberg, & Poe, 2003; Dickinson & Tabors, 2001) can contribute to young children’s language growth. In this study, we examined variability in preschoolers’ alphabet naming, letter–word recognition, and vocabulary growth and how such growth might be affected by variation in preschool classroom literacy activities.

The effect of amount and types of classroom activities, however, may depend on the language and early reading skills with which children begin school. Child × Instruction interactions have been observed in first grade (Connor, Morrison, & Katch, 2004; Foorman et al., 1998; Juel & Minden-Cupp, 2000), in third grade (Connor, Morrison, & Petrella, 2004), and in interventions for children with learning disabilities (Torgesen, 2000). One study of first-grade classrooms (Connor, Morrison, & Katch, 2004) found that students with lower fall decoding and vocabulary skills demonstrated greater decoding skill growth in classrooms that spent more time in TM explicit decoding activities, with small amounts of CM meaning-focused activities in the fall that increased throughout the school year. Yet the opposite was the case for students with stronger fall decoding and vocabulary skills. For them, time spent in explicit decoding instruction had little impact, yet students demonstrated greater decoding skill growth when they were in classrooms with higher amounts of CM meaning-focused activities all year long. In this study, we investigated whether there are similar Child × Instruction interaction effects for preschoolers.

Research Questions

The purpose of this study was to examine the association of amount and type of preschool language and literacy activities with students’ vocabulary and emergent reading skill growth. The following research questions were posed: (a) What is the nature of variation (amount and type) in preschool language and literacy activities (both explicit and implicit) observed in preschool classrooms relative to other activities (art, music, math, etc.)? (b) How are differing amounts of time spent in language and literacy activities related to preschoolers’ vocabulary and emergent literacy growth, and does the effect of specific types of preschool language and literacy activities, across multiple dimensions, depend on the outcome of interest? For example, do preschool activities that predict letter–word knowledge also contribute to vocabulary growth? and (c) Does the effect of amount and type of preschool language and literacy activities depend on the language and early reading skills children bring to the classroom? Are there Child × Instruction interactions?

For the first research question, we hypothesized that in these high-quality preschool classrooms, at least some time would be devoted to explicit and implicit emergent literacy and language activities but that much of the day would include other activities such as art, math, and noninstructional time.

With regard to the second research question, we hypothesized that language and literacy instructional activities, both explicit and implicit, would be associated with growth in preschoolers’ language and emergent literacy. On the basis of previous research findings, we anticipated that explicit and implicit meaning-focused activities might have a positive effect on students’ vocabulary growth but not on letter–word or alphabet knowledge growth in light of the specificity found in other studies with preschoolers (Senechal & LeFevre, 2002; Senechal et al., 1998). Predictions regarding the effect of explicit, emergent, code-focused instruction were more difficult given the equivocal research findings in this area. We conjectured, relying on studies with parents (Senechal & LeFevre, 2002) and preschool curriculum comparisons (Graue et al., 2004; Stipek et al., 1995), that more time spent in explicit code-focused instruction would be associated with greater growth in students’ emergent literacy skill growth (e.g., alphabet and letter–word) but would not be systematically related to children’s vocabulary growth.

With regard to our third research question, we hypothesized that the effect of specific language and literacy activities would depend on students’ entering vocabulary, alphabet, and letter–word recognition skills. We anticipated that children with weaker early literacy and vocabulary scores would demonstrate greater skill growth when they spent greater amounts of time in TM and TCM activities focused on activities explicitly related to a given outcome. We anticipated that students with weaker alphabet and letter–word scores would demonstrate greater growth when they experienced more time in TCM, explicit, code-focused activities than would students with stronger alphabet and letter–word skills. Students with weaker entering vocabulary skills would demonstrate greater vocabulary growth when they spent more time in TCM meaning-focused activities that focused explicitly on language development than would students with stronger fall vocabulary skills.
Method

Participants

This study was conducted in a transitioning economically and ethnically diverse community, located on the urban fringe of a major midwestern city, in a school district serving over 6,400 children from preschool through high school. The district is fairly unique in that, in addition to Head Start and state-funded programs for preschool-age children at risk for academic underachievement, the district provides state-licensed preschool (full-day and half-day) programs for typically developing 3- and 4-year-old students on a fee-for-service basis. Classrooms are housed in six elementary schools throughout the district. The district has open borders, which means that students living in the neighboring communities (including the major city) could attend district schools.

Student participants were recruited at the beginning of the school year through direct and backpack mail. Any child who attended the school district preschool program was eligible to join the study. Approximately 38% of the parents who were invited agreed to participate. Eighty-eight participants were girls and 76 were boys (N = 156). Children were, on average, 4 years of age and ranged from 3 to 5 years of age in the fall. They represented the diversity of the district fairly well. Frequent interactions with teachers and participating children in the schools indicated that children whose parents returned the consent form did not differ appreciably from children whose parents did not. We deliberately reached out and extended multiple invitations to parents of children in the Head Start and state-supported preschool programs. On the basis of parent report, 28 of 131 children belonged to ethnic minorities including African American (n = 8), Hispanic (n = 4), Middle Eastern (n = 8), and Asian (n = 8). Parents reported the remaining children to be European, European American, or White (n = 103). Ten parents reported that a language other than English was spoken in the home. Overall, all mothers but one graduated from high school, 27 had 1–3 years of college, 57 completed college, and 149 had postgraduate experience; the remaining mothers did not report their education level. Fathers demonstrated a similar distribution. All but one completed high school, 14 had some college experience, 59 completed college, and 49 had postgraduate experience. Missing data analyses revealed no significant difference in fall and spring outcomes or for amount and type of literacy instruction received between students for whom parent education and ethnicity was reported (i.e., the questionnaire returned or parent did not answer question) and for whom they were not. Race–ethnic group and a language other than English spoken at home did not predict child outcomes once students’ fall scores were entered into the model during model building.

Children were followed into 1 of 34 classrooms taught by 25 teachers (9 teachers taught morning and afternoon classes or classes that met on different days of the week). There were, on average, 4 child participants per class, although this varied from 1 to 10. Class size maximum was 16 children. Three of the classrooms provided preschool intervention for children identified as at risk of underachievement because of poverty or other risk factors. Two of these classrooms were Head Start programs, and one was a state-funded, school-readiness program. The state-funded program was part of a statewide initiative that served over 25,700 4-year-old students statewide, that cost approximately $3,300 per enrolled child, and that was ranked 13th in access and 19th in resources among states nationwide (National Institute for Early Education Research, 2004).

Analyses revealed that children in the Head Start and state-funded classrooms (Head Start–state) and children in the fee-for-service classrooms did not enter preschool with significantly different scores on the letter–word recognition or vocabulary measures (Wilks’ λ = .969), F(3, 149) = 1.57, p = .198, nor were there age differences. Indeed, only about 10% of the students in this sample whose scores fell in the lowest quartile (W score < 312; as discussed below, the W score is a transformation of the Rasch ability scale) on the fall Woodcock–Johnson—III Tests of Achievement (McGrew, Werder, & Woodcock, 1991) letter–word recognition assessment attended the Head Start–state classrooms, although as a percentage, a greater number of the children in Head Start–state programs (44%) had letter–word scores in the lowest quartile compared with the fee-for-service classrooms (22%). Similar patterns were observed for fall vocabulary skills; only 2 of the 26 children with the lowest fall vocabulary scores (W score < 456) attended the Head Start–state classrooms. Post hoc analyses revealed that children in the Head Start–state classrooms knew significantly fewer letters than did children attending fee-for-service classrooms (about 5 compared with 11), (151) = .214, p < .05, although a multivariate analysis by school revealed no significant difference in full alphabet, letter–word recognition, or vocabulary scores by school (Wilks’s λ = .857), F(15, 400.7) = 1.54, p = .088.

Teachers met all state and district certification requirements and, in general, were well qualified to be preschool teachers. They had, on average, 5.83 years of experience (SD = 5.29) and all had a 4-year degree. Four teachers had a master’s degree. Teachers for the intervention programs (e.g., Head Start) met the same district certification requirements as the other preschool teachers.

Procedure

This study was conducted during the 1st year (2002–2003) of a 5-year longitudinal study on children’s transition to school. Students were individually assessed in the fall and again in the spring on a battery of language and literacy tasks. Testing was conducted by research staff in a quiet place in the school building. Parents and teachers completed questionnaires, which were sent to them in the winter and spring of the school year. Parent questionnaires were designed to obtain information regarding parents’ education levels and other sociocultural information about their children, including race and native language. Teacher questionnaires were designed to gather information about teachers’ qualifications including educational level, certification, and years of experience teaching. We conducted informal classroom observations throughout the school year and a midyear half-day videotaped observation in each classroom to closely examine the language and literacy activities in which teachers and preschool students were engaged, in addition to other activities (e.g., math, games, noninstructional time, etc.).

Measures

Child Assessment

Alphabet task. In this informal task, children were asked to name each of the 26 lowercase letters in the alphabet as they were presented one at a time using shuffled flash cards. The raw score represents the number of letters the child identified correctly.

Letter–word recognition. Children’s letter and word recognition skills were assessed using the Woodcock–Johnson—III Tests of Achievement (McGrew et al., 1991; Mather & Woodcock, 2001) Letter–Word Identification test. In this task, children were first asked to identify letters in large type. The remaining items required the child to read words, which were listed approximately eight to a page and were increasingly unfamiliar. For analysis purposes, raw scores were converted to W scores, which are a “special transformation of the Rasch ability scale” (Mather & Woodcock, 2001, p. 72). Rasch ability scale scores provide equal-interval measurement characteristics. W scores are centered at 500, which represents the achievement of a typical 10-year-old child. The test sample has a W score mean of 327.23 (SD = 34.18, SEM = 3.69) for a child 4 years of age, with a median reliability of .98 for children in this age range (McGrew, 1991).

Vocabulary. Children’s vocabulary was assessed using the Woodcock–Johnson—III Tests of Achievement Picture Vocabulary test. In this task, children are asked to name pictures of increasingly unfamiliar items. Primarily an expressive vocabulary task, it was designed to assess children’s oral language and lexical knowledge, with a median reliability of
.81. Again, W scores were used in the analyses, which for this test have a test sample mean of 460.63 (SD = 17.46, SEM = 7.70) for 4-year-old children (McGrew et al., 1991).

Classroom Observations

Classrooms were observed informally throughout the school year. During the winter (January, February, or March), the classrooms were videotaped for the entire morning or afternoon (approximately 2 hr). Taping sessions were scheduled at the teachers’ convenience and avoided days that students participated in special activities such as physical education and library. If the teacher was absent or there were unforeseen events (e.g., fire drill), the observation was rescheduled. In all cases, research observers reported that the videotaped classroom observation was representative of the informal observations conducted throughout the school year. All-day classes were observed only in the morning following the recommendations of teachers and school staff. On the basis of researchers’ preliminary observations of all-day classes, during the afternoons, children spent substantial time napping, snacking, and in free-play activities.

Two high-quality digital video cameras (Panasonic Model PV-DV102D and Sony Model DCR-TRV17) were used to capture the classroom activities. One was set on a tripod and located so as to capture as much of the classroom as possible. The other camera was hand held by an observer in a corner of the classroom to capture multiple groups and to follow participating children if they wandered out of range of the stationary camera. For some classrooms, a third camera was used. All cameras had high-quality microphones that successfully captured the teachers’ and students’ voices. Observers also recorded detailed field notes including descriptions of the participating children (clothing, distinctive hair styles), which were used to supplement and confirm the video and audio recording during coding.

Videos were coded using the Noldus Observer Pro system (Noldus Information Technology, 2001), which permits direct coding of video (see Figure 1). All videotapes for each classroom were viewed, and the tape providing the most complete information was selected for coding. These

Figure 1. A screenshot of the Noldus Observer Pro work space. Note the video on the right with video controls, the coded states on the upper left, and the available codes on the lower left. From “Suzanne and Erin on Sidewalk.mpg [Video],” by A. Spink (Producer), 2002, Ede, the Netherlands: Noldus Information Technology. Copyright 2002 by Noldus Information Technology. Reprinted with permission.
videos were viewed repeatedly as they were coded. Coders utilized information from the other videos and field notes as needed to identify specific student and teacher activities. Only the time that the children were in the classroom was coded. For example, recess outside was not coded. Relevant excerpts from the coding manual, including a list of the language arts activities, are provided in Appendix A; a screen shot of the software is provided in Figure 1.

The coding scheme tracks the amount of time, in minutes:seconds, that teachers and participating students spend in both academic and nonacademic activities. Language–literacy, math, science, art, play, and music compose the main instructional areas. Noninstructional codes include ritual (e.g., pledge of allegiance), transition (e.g., waiting in line to go to recess), and orient–organize (e.g., teacher explaining the various center activities). In order to be coded, any activity must have lasted at least 15 s. Codes were designed to be used longitudinally as participating students were followed longitudinally through their transition to first grade.

Intercoder reliability was computed by the Noldus software by comparing time and activity for the same classroom videotape coded by two different researchers for 25% of the tapes selected at random. For each comparison, reliability exceeded 85% and ranged from 86% to 92%.

A key advantage of this system is that activities may be coded for each individual student. Students in the same classroom experience different amounts and types of activities, and this difference is recorded. Thus, there is student-level instruction with unique amounts and types of instruction for each student, and there is classroom-level instruction, in which all of the students in the classroom share the same amount and type of instruction. So, for example, 1 target student (Student A) might participate in a small-group activity with the teacher focusing on learning letters, while another target student (Student B), in the same classroom at the same time, is reading a book quietly to herself. In this case, students are participating in student-level instructional activities. Student A is participating in a TCM, code-focused, student-level activity, and Student B is participating in a CM, meaning-focused, student-level activity. If, during circle time, a whole-class activity, the teacher discusses the meaning of the word of the day, then that is a TCM, meaning-focused, classroom-level activity; all of the students, including the 2 target students, are participating in the same amount and type of instruction at the same time. The dimensions of instruction are described further in the next section. Selected excerpts from the coding manual are included in Appendix A. Actions of the primary and assistant teachers and aides were coded separately. Generally, the primary teacher provided the classroom-level instruction, whereas the assistant teachers and aids helped during small-group activities. Preliminary analyses revealed that activities conducted by the primary teacher or the assistant teachers and aids helped during small-group activities. Preliminary analyses revealed that activities conducted by the primary teacher or the assistant teachers and aids helped during small-group activities.

Instruction. For every class, the amount of each classroom-level and student-level instructional activity was identified and coded using the dimensions of instruction—explicit versus implicit, TM versus TCM versus CM, and meaning focused versus code focused—and placed in their appropriate sector (see Table 1).

Instruction variables, representing minutes per day, were computed by adding the amounts of time (in minutes) spent in each sector (see Table 2). Negligible amounts of TM, explicit meaning-focused, student-level instruction were observed and so TM and TCM amounts were summed.

For alphabet and letter–word outcomes, there are four classroom-level variables and three student-level variables (see Table 1) expressed in minutes per day. Descriptive statistics are provided in Table 2. For vocabulary, there are four classroom-level variables and five student-level variables. Except for CM, implicit meaning-focused activities, the variables for alphabet, letter–word, and vocabulary are the same and differ only in whether they are implicit or explicit for the specific outcome of interest. In other words, activities that are explicit for vocabulary are implicit for alphabet and letter–word and vice versa. To simplify the variable names, we used shorter sector names so that each sector has the same name, regardless of which outcome is the one of interest, keeping in mind that explicit and implicit varies for our decoding and vocabulary outcomes. Sector labels are provided in Table 1 and include both classroom and student levels of play—TCM code focused, CM code focused, TM meaning focused, TCM meaning focused, CM code focused, CM meaning focused, and CM meaning focused. Note that for alphabet and letter–word recognition, CM meaning-focused and CM play are summed (CM implicit meaning focused), whereas for vocabulary, they are separate variables (play is implicit vocabulary).

Type of classroom, teacher, and home variables. A variable, Head Start–state, was created to account for the effect of enrollment in a preschool intervention program for children at risk of underachievement. Students in the three Head Start–state classrooms were coded 1; students in all other classrooms were coded 0 (Cohen & Cohen, 1983). Teacher and parent variables were created on the basis of information from their respective questionnaires and included teachers’ years of experience and education as well as parents’ years of education.

Results

Analytic Strategies

Hierarchical linear modeling (HLM; Version 6.0; Raudenbush & Bryk, 2002) was used to control for the nested nature of the data (i.e., students are nested in classrooms). The effects of instruction may be misestimated if the shared variance among children who share the same teacher and classroom environment is not considered. Although classrooms were nested in teachers (e.g., some teachers taught a morning and an afternoon class), three-level models with students nested in classrooms nested in teachers revealed no significant variance at the level of the teacher, so more parsimonious two-level models were used except to test specific teacher-level variables (e.g., years of experience). Student variables (e.g., fall score, small group, and individual instruction), including Student-Level Instruction × Child interaction terms

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCM–code focused</td>
<td>2.91</td>
<td>3.83</td>
<td>0.00</td>
<td>15.00</td>
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<tr>
<td>TM–meaning focused</td>
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<td>1.65</td>
<td>0.00</td>
<td>7.35</td>
</tr>
<tr>
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<td>8.90</td>
<td>7.69</td>
<td>0.00</td>
<td>30.68</td>
</tr>
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<td>CM–meaning focused</td>
<td>0.16</td>
<td>0.72</td>
<td>0.00</td>
<td>3.93</td>
</tr>
<tr>
<td>CM–meaning-focused play</td>
<td>0.48</td>
<td>1.53</td>
<td>0.00</td>
<td>6.18</td>
</tr>
<tr>
<td><strong>Student level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.07</td>
<td>0.58</td>
<td>0.00</td>
<td>6.35</td>
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<td>TM–TCM meaning focused</td>
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<td>0.00</td>
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<tr>
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<td>0.00</td>
<td>17.57</td>
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<tr>
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<td>0.94</td>
<td>0.00</td>
<td>7.57</td>
</tr>
<tr>
<td>CM–meaning-focused play</td>
<td>11.62</td>
<td>15.00</td>
<td>0.00</td>
<td>66.20</td>
</tr>
</tbody>
</table>

Note. CM meaning focused and CM meaning-focused play are summed to create CM implicit decoding. TCM = teacher–child managed; TM = teacher managed; CM = child managed.
(e.g., Fall Letter–Word Score $\times$ TCM, Code-Focused, Student-Level Variables) were entered at Level 1, and classroom variables (e.g., classroom-level instruction) were entered at Level 2. In HLM, interactions can be modeled between Levels 1 and 2 (e.g., $\gamma_{21} \ldots$ [classroom instruction variables]). Nonsignificant variables were trimmed to create more parsimonious models. A model was built for each child outcome—alphabet, letter–word recognition, and vocabulary. A model for letter–word recognition, as an exemplar, and additional information on interpreting HLM results are provided in Appendix B.

The outcomes represent growth in scores (i.e., spring score controlling for fall score). All continuous variables were centered at the grand mean for the sample. Thus, coefficient values represent the effect of variable values above or below the mean for the sample. In the exemplar model (see Appendix B), $\gamma_{00}$ the mean spring letter–word recognition, is the fitted score for a child with typical fall scores (i.e., the child’s score falls at the mean for the sample), who is not enrolled in either a Head Start or state-funded program and who receives typical amounts of instruction. Except for the instruction variables and fall score, nonsignificant variables were trimmed to create more parsimonious models.

On average, the preschoolers in this study exhibited age-appropriate gains in alphabet, letter–word, and vocabulary skills (see Table 3). Children who began the year with stronger fall scores generally demonstrated greater growth in alphabet, letter–word, and vocabulary skills, whereas children who began the year with weaker scores demonstrated less skill growth (see Tables 4, 5, and 6). Mother’s education and whether children attended a Head Start classroom had no systematic relation with any of the child outcomes. The child outcomes were positively correlated (see Table 7), with alphabet and letter–word most strongly positively correlated with each other.

In this study, we asked (a) what is the nature of and variation in amounts and types of language and literacy-related activities observed in these preschool classrooms? (b) In what ways are these activities related to growth in preschoolers’ alphabet, letter–word recognition, and vocabulary growth, and is there indication of specificity of learning? In other words, do meaning-focused activities tend to predict vocabulary rather than alphabet or letter–word recognition, and do emergent code-focused activities tend to predict alphabet and letter–word but not vocabulary growth? and (c) Are there Child $\times$ Instruction interactions? We discuss our findings for each question below.

### Table 3

<table>
<thead>
<tr>
<th>Student outcome</th>
<th>Fall $M$</th>
<th>Fall $SD$</th>
<th>Fall Range</th>
<th>Spring $M$</th>
<th>Spring $SD$</th>
<th>Spring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphabet naming</td>
<td>11.21</td>
<td>8.19</td>
<td>0–26</td>
<td>15.79</td>
<td>8.13</td>
<td>0–26</td>
</tr>
<tr>
<td>Letter–word recognition W</td>
<td>334.80</td>
<td>25.08</td>
<td>270–400</td>
<td>350.27</td>
<td>31.98</td>
<td>130–464</td>
</tr>
<tr>
<td>Letter–word standard score</td>
<td>118.00</td>
<td>21.00</td>
<td>71–191</td>
<td>118.00</td>
<td>17.00</td>
<td>79–193</td>
</tr>
<tr>
<td>Vocabulary W</td>
<td>466.59</td>
<td>15.79</td>
<td>374–502</td>
<td>472.82</td>
<td>13.36</td>
<td>417–506</td>
</tr>
<tr>
<td>Vocabulary standard score</td>
<td>112.00</td>
<td>12.00</td>
<td>67–141</td>
<td>112.00</td>
<td>12.00</td>
<td>63–148</td>
</tr>
</tbody>
</table>

*Note.* Standard score test sample mean = 100 ($SD = 15$).
For example, time spent on vocabulary activities ranged from 0 to 4 min, although the mean for the sample was about 8 s per day. TCM, code-focused, classroom-level activities accounted for less than 3 min per day of class time, on average (see Figure 3, bottom). Of this time, about 1 min 10 s per day was spent in phonological awareness activities such as rhyming, elision, and blending. Forty seconds were spent on alphabet activities, with an additional 50 s on letter–sound correspondence activities. About 10 s per day, on average, were spent on spelling activities. Here too, classrooms differed in, for example, time spent in phonological awareness activities varying from 0 to 10 min and time on alphabet activities ranging from 0 min to about 5 min.

Time in CM, meaning-focused, classroom-level activities ranged from 0 to 4 min ($M = 9$ s), and all of this time was spent in independent emergent reading activities. For example, the students in the class selected a book from the classroom library and read it (for most, this was emergent reading; Sulzby, 1985) or looked at the pictures. There was some CM meaning-focused play–classroom-level activity (0.5 min per day, range = 0–6 min per day). There were no observed CM, code-focused, classroom-level activities (e.g., phonics worksheets).

Student-level instruction accounted for a smaller proportion of the time spent in language and literacy instruction, but this varied substantially among classrooms. Most of this time was comprised primarily of CM meaning-focused play (11.3 min per day, range = 0.0–66.2). Much less time was spent on TCM meaning-focused activities (see Figure 3, bottom), but, again, there was variability in amount across classrooms ($M = 0.88$ min, range = 0–65 min per day). Of this time, almost half (46 s) was spent in small-group sharing time. A generally negligible amount of time was spent on TCM code-focused activities ($M = 0.07$ min; see Figure 3, bottom), but this varied across classrooms ranging from 0 min to more than 6 min per day. Most of this time was spent in alphabet activities and included writing the letters of the alphabet. CM code-focused activities ($M = 0.37$ min, range = 0.0–17.5 min) included alphabet and handwriting activities. CM meaning-focused activities ($M = 0.21$ min, range = 0.0–7.6 min per day), including independent emergent reading activities, split evenly between individual student and small-group contexts; each context ranged from 0 min to more than 4 min per day across classrooms.

Children within the same classroom experienced widely different amounts and types of language and literacy activities. For example, in one classroom with 3 target children, Child A spent more than 17 min in CM, code-focused, student-level activities; almost 2 min in CM meaning-focused play; and just over 3 min in TCM code-focused activities. In contrast, Child B spent just 3 min in CM, code-focused, student-level activities; 16 min in CM meaning-focused play; and more than 6 min in TCM code-focused activities. This was while, at the same time, Child C spent 0 min in CM code-focused activities, 3 min in CM meaning-focused play, and 0 min in TCM code-focused activities (most of the time was spent in art activities). It is interesting to note that Child C

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Hierarchical Linear Modeling Results for Alphabet Naming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed effect</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept, $\beta_0$</td>
<td>15.72</td>
</tr>
<tr>
<td>Overall amount (hours/week), $\gamma_{01}$</td>
<td>0.12</td>
</tr>
<tr>
<td>TCM-code focused–classroom level, $\gamma_{02}$</td>
<td>0.20</td>
</tr>
<tr>
<td>TCM-meaning focused–classroom level, $\gamma_{03}$</td>
<td>-0.08</td>
</tr>
<tr>
<td>TM–meaning focused–classroom level, $\gamma_{04}$</td>
<td>-0.0006</td>
</tr>
<tr>
<td>CM–implicit code focused–classroom level, $\gamma_{05}$</td>
<td>0.03</td>
</tr>
<tr>
<td>For fall letter–word recognition score, $\beta_1$</td>
<td>0.11</td>
</tr>
<tr>
<td>For fall vocabulary score, $\beta_2$</td>
<td>0.005</td>
</tr>
<tr>
<td>For fall alphabet score, $\beta_3$</td>
<td>0.55</td>
</tr>
<tr>
<td>Effect of Overall Amount $\times$ Alphabet, $\gamma_{31}$</td>
<td>-0.008</td>
</tr>
<tr>
<td>Effect of TCM-code focused–classroom level, $\gamma_{32}$</td>
<td>-0.017</td>
</tr>
<tr>
<td>For TCM–code focused–student level, $\beta_4$</td>
<td>2.17</td>
</tr>
<tr>
<td>For TCM–meaning focused–student level, $\beta_5$</td>
<td>0.01</td>
</tr>
<tr>
<td>For CM–code focused–student level, $\beta_6$</td>
<td>-0.09</td>
</tr>
<tr>
<td>For CM–implicit code focused–student level, $\beta_7$</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Random effects

<table>
<thead>
<tr>
<th>Variance component</th>
<th>df</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept, $u_0$</td>
<td>0.01</td>
<td>28</td>
<td>28.60</td>
</tr>
<tr>
<td>Level 1, $r$</td>
<td>15.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Deviance = 839.61. TCM = teacher–child managed; TM = teacher managed; CM = child managed; $u =$ classroom-level error; $r =$ student-level error.
began the school year knowing all the letters in the alphabet, whereas Child A and Child B knew only 1 and 7 letters, respectively. By the end of the year, they knew 19 and 18 letters, respectively.

**Correlations Among Instructional Strategies**

There was some systematic pattern among the instructional strategies. None of the student-level instruction variables were correlated, with one notable exception. Teachers who spent more time in TM, meaning-focused, student-level activities also tended to provide more time in CM, meaning-focused play, student-level activities ($r = .43, p = .011$). At the classroom level, teachers who provided more time in TCM, code-focused, classroom-level activities also provided more time in CM, meaning-focused, classroom-level activities ($r = .46, p < .001$). Plus, teachers who provided more time in TCM, code-focused, classroom-level activities also tended to provide more time in CM, code-focused, classroom-level activities.

Associations between classroom- and student-level instruction variables were computed using HLM, with each student-level instruction type as the outcome and each classroom-level instruction type as a predictor. Because this required 30 separate models, a Bonferroni correction was applied only to these analyses, and alpha was set at .001 (http://home.clara.net/sisa/bonfer.htm). Results revealed that teachers who provided more time in CM, meaning-focused, student-level activities also provided more time in CM, meaning-focused, classroom-level activities ($\gamma_{01} = .605, p < .001$).

There did not appear to be any trade-off between code- and meaning-focused activities at either the student or classroom level. For example, teachers who provided children with more time in meaning-focused activities were no more or less likely to provide more time in code-focused activities.

**Overall Amount of Preschool**

Children could attend either half- or whole-day classrooms and could attend anywhere from 2 to 5 days per week on a regular basis. Thus, the overall amount of time preschool children could attend varied by classroom from 6 to 30 hr per week, with a mean of 15 hr per week. The number of hours per week children attended preschool related to both alphabet and letter–word recognition score growth but not vocabulary growth (see Tables 4, 5, and 6 and Figures 4, top, and 5, top). Generally, children who attended preschool more hours per week achieved stronger alphabet and letter–word score growth than did children who attended preschool for fewer hours per week. There was no significant relation between hours per week attended and vocabulary score growth. Generally, however, children with weaker fall vocabulary scores

### Table 5

**Hierarchical Linear Modeling Results for Letter–Word Recognition**

<table>
<thead>
<tr>
<th>Fixed effect</th>
<th>Coefficient</th>
<th>SE</th>
<th>t(df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept, $\beta_0$</td>
<td>345.64</td>
<td>2.08</td>
<td>165.93(28)</td>
<td>.000</td>
</tr>
<tr>
<td>Overall amount (hours/week), $\gamma_{01}$</td>
<td>0.44</td>
<td>0.11</td>
<td>4.45</td>
<td>.000</td>
</tr>
<tr>
<td>TCM–code focused–classroom level, $\gamma_{02}$</td>
<td>0.38</td>
<td>0.38</td>
<td>1.01</td>
<td>.324</td>
</tr>
<tr>
<td>TCM–meaning focused–classroom level, $\gamma_{04}$</td>
<td>-0.15</td>
<td>0.25</td>
<td>-0.60</td>
<td>.555</td>
</tr>
<tr>
<td>TM–meaning focused–classroom level, $\gamma_{05}$</td>
<td>2.08</td>
<td>1.11</td>
<td>1.87</td>
<td>.08</td>
</tr>
<tr>
<td>CM–implicit code focused–classroom level, $\gamma_{03}$</td>
<td>-0.13</td>
<td>1.14</td>
<td>-0.12</td>
<td>.910</td>
</tr>
<tr>
<td>For fall letter–word recognition W score, $\beta_1$</td>
<td>0.55</td>
<td>0.08</td>
<td>6.45(137)</td>
<td>.000</td>
</tr>
<tr>
<td>Effect of TCM–Code Focused–Classroom Level × Fall Letter–Word Score, $\gamma_{11}$</td>
<td>-0.03</td>
<td>0.01</td>
<td>-2.20</td>
<td>.029</td>
</tr>
<tr>
<td>Effect of TCM–Meaning Focused–Classroom Level × Fall Letter–Word Score, $\gamma_{12}$</td>
<td>0.02</td>
<td>0.009</td>
<td>2.41</td>
<td>.018</td>
</tr>
<tr>
<td>For fall vocabulary score, $\beta_2$</td>
<td>0.27</td>
<td>0.14</td>
<td>2.02(137)</td>
<td>.045</td>
</tr>
<tr>
<td>Effect of Overall Amount (hours/week) × Fall Vocabulary Score, $\gamma_{21}$</td>
<td>-0.02</td>
<td>0.009</td>
<td>-2.43</td>
<td>.017</td>
</tr>
<tr>
<td>For fall alphabet score, $\beta_3$</td>
<td>1.08</td>
<td>0.30</td>
<td>3.80(137)</td>
<td>.000</td>
</tr>
<tr>
<td>Effect, $\gamma_{30}$</td>
<td>3.70</td>
<td>1.67</td>
<td>2.22(137)</td>
<td>.028</td>
</tr>
<tr>
<td>For TCM–code focused–student level, $\beta_4$</td>
<td>-0.28</td>
<td>0.09</td>
<td>-3.05(137)</td>
<td>.003</td>
</tr>
<tr>
<td>Effect, $\gamma_{40}$</td>
<td>0.80</td>
<td>0.86</td>
<td>0.93(137)</td>
<td>.355</td>
</tr>
<tr>
<td>For TM–TCM–code focused–student level, $\beta_5$</td>
<td>-0.03</td>
<td>0.07</td>
<td>-0.49(137)</td>
<td>.622</td>
</tr>
<tr>
<td>Effect, $\gamma_{50}$</td>
<td>7.64</td>
<td>3.22</td>
<td>2.38(139)</td>
<td>.019</td>
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<tr>
<td>For boy, $\beta_6$</td>
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<td>Effect, $\gamma_{60}$</td>
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<th>$\chi^2$</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Intercept, $u_0$</td>
<td>0.12</td>
<td>28</td>
<td>14.77</td>
<td>&gt;.50</td>
</tr>
<tr>
<td>Level 1, $r$</td>
<td>390.53</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Deviance = 1,356. TCM = teacher–child managed; TM = teacher managed; CM = child managed; $u$ = classroom-level error; $r$ = student-level error.
were more likely to spend more hours per week attending preschool than were children with stronger fall vocabulary scores (γ_{01} = −.34, p < .001).

Relations Among Instructional Strategies and Child Outcomes

The language and literacy activities that we observed in these classrooms had a systematic and significant relation with students’ growth in alphabet knowledge, letter–word recognition, and vocabulary skills. Moreover, the relations were specific. In all cases, when there was a main effect of instruction (the instruction had an effect on student growth regardless of child characteristics), explicit code-focused activities positively predicted alphabet and letter–word recognition, and explicit meaning-focused activities positively predicted vocabulary. For example, children who spent more time in classroom- and student-level TCM code-focused instruction, on average, learned more letters of the alphabet than did children who spent

<table>
<thead>
<tr>
<th>Fixed effect Coefficient</th>
<th>SE</th>
<th>t(df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean spring vocabulary W score, γ_{00}</td>
<td>473.04</td>
<td>0.94</td>
<td>501.88(27)</td>
</tr>
<tr>
<td>Overall amount (hours/week), γ_{01}</td>
<td>−0.02</td>
<td>0.10</td>
<td>−0.15</td>
</tr>
<tr>
<td>TCM–code focused–classroom level, γ_{02}</td>
<td>0.12</td>
<td>0.18</td>
<td>0.70</td>
</tr>
<tr>
<td>TCM–meaning focused–classroom level, γ_{03}</td>
<td>0.13</td>
<td>0.11</td>
<td>1.23</td>
</tr>
<tr>
<td>TM–meaning focused–classroom level, γ_{04}</td>
<td>0.79</td>
<td>0.35</td>
<td>2.27</td>
</tr>
<tr>
<td>CM–meaning focused–classroom level, γ_{05}</td>
<td>2.05</td>
<td>0.93</td>
<td>2.21</td>
</tr>
<tr>
<td>CM–meaning-focused play–classroom level, γ_{06}</td>
<td>0.60</td>
<td>0.46</td>
<td>1.29</td>
</tr>
</tbody>
</table>

For child age, β₁

Effect, γ_{10} | 3.17 | 1.65 | 1.91(33) | .063 |

For fall vocabulary score, β₂

Effect, γ_{20} | 0.43 | 0.035 | 12.10(137) | .000 |

Effect of TCM–Code Focused–Classroom Level × Fall Vocabulary, γ_{21} | 0.03 | 0.007 | 4.15 | .000 |

Effect of TCM–Meaning Focused–Classroom Level × Fall Vocabulary, γ_{22} | −0.01 | 0.005 | −2.72 | .008 |

Effect of TCM–Meaning-Focused Play–Classroom Level × Fall Vocabulary, γ_{23} | −0.09 | 0.03 | −3.54 | .001 |

For fall alphabet score, β₃

Effect, γ_{30} | 0.23 | 0.10 | 2.45(137) | .015 |

For TCM–code focused–student level, β₄

Effect γ_{40} | −1.26 | 0.76 | −1.64(137) | .102 |

Effect γ_{45} | 0.06 | 0.06 | 0.89(137) | .377 |

For CM–code focused–student level, β₅

Effect, γ_{50} | −0.10 | 0.30 | −0.33(138) | .742 |

For CM–meaning focused–student level, β₆

Effect, γ_{60} | −0.56 | 0.52 | −1.07(137) | .285 |

For CM–meaning-focused play–student level, β₇

Effect, γ_{70} | −0.02 | 0.04 | 0.48(137) | .631 |

Random effect Variance df χ² p

| Intercept, u₀ | 10.69 | 25 | 37.34 | .053 |
| Child age, u₁ | 0.73 | 31 | 21.49 | .50 |
| Level 1, r | 66.98 |

Note. Deviance = 1,102.55. TCM = teacher–child managed; TM = teacher managed; CM = child managed; u = classroom-level error; r = student-level error.

Table 7
Correlations Among Child Outcome Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Letter–word identification W fall</td>
<td>—</td>
<td>.314**</td>
<td>.837**</td>
<td>.692**</td>
<td>.345**</td>
<td>.752**</td>
</tr>
<tr>
<td>2. Vocabulary W fall</td>
<td>—</td>
<td>.277**</td>
<td>.224**</td>
<td>.654**</td>
<td>.193*</td>
<td>.193*</td>
</tr>
<tr>
<td>3. Alphabet raw score fall</td>
<td>—</td>
<td>.680**</td>
<td>.377**</td>
<td>.806**</td>
<td>.806**</td>
<td>.806**</td>
</tr>
<tr>
<td>4. Letter–word identification W spring</td>
<td>—</td>
<td>.358**</td>
<td>.696**</td>
<td>.696**</td>
<td>.696**</td>
<td>.696**</td>
</tr>
<tr>
<td>5. Vocabulary W spring</td>
<td>—</td>
<td>.287**</td>
<td>.287**</td>
<td>.287**</td>
<td>.287**</td>
<td>.287**</td>
</tr>
</tbody>
</table>

* p < .05. ** p < .01.
less time in these activities (see Table 4). For letter–word recognition, children who spent more time in TCM, code-focused, student-level activities demonstrated greater growth in scores than did children who spent less time in these activities (see Table 5).

For vocabulary, children who spent more time in TCM, meaning-focused, classroom-level activities and less time in TCM, code-focused, student-level activities exhibited greater vocabulary growth than did children who spent less time in the meaning-focused activities and more time in the code-focused activities. The effect size for amount (minutes/day) of TCM, code-focused, student-level instruction was negligible (see Table 8). The effect size for amount of TCM, meaning-focused, classroom level instruction was greater for children with weaker fall vocabulary skills than it was for children with stronger fall vocabulary skills (see Figure 6 and Table 8).

**Child × Instruction Interactions**

Although there was evidence of specificity of learning in the main effects, our hypothesis regarding specificity of instruction as it related to child outcomes was not entirely supported. As we anticipated, there were Child × Instruction interactions; the effect of some instructional strategies depended on children’s skills at the beginning of the year. Because of these interactions, generally, the specificity of instruction was less apparent for children with stronger fall language and literacy skills. For example, children with stronger fall vocabulary scores demon-
TCM-MF Minutes per Day

- Read aloud w discussion
- Read aloud
- Discussion
- Sharing
- Vocabulary, comprehension, COP, other

TCM-CF Minutes per day

- Class
- Student

Phonological awareness
- Alphabet
- Letter-sound
- Spelling
strated greater vocabulary growth when they spent more time in TCM meaning-focused activities and more time in TCM code-focused activities. In contrast, for children with weaker fall vocabulary scores, TCM meaning-focused activities, but not TCM code-focused activities, were related to increases in vocabulary growth. Similar findings held for children’s letter–word recognition skill growth. The details are provided below.

For each of our outcomes—alphabet, letter–word recognition, and vocabulary—there were Child × Instruction interactions. Because these Child × Instruction interactions differed for each of the outcomes, we present the results for each model separately below.

**Alphabet**

Children in classrooms that spent more time in TCM, code-focused, classroom-level activities achieved stronger spring alphabet scores, on average, but these effects were greater for students who knew fewer letters in the fall (e.g., 4) compared with children who knew more letters (e.g., 18; see Table 4 and Figure 4, bottom). TCM, code-focused, student-level activities had a greater effect size ($d = 0.28$ for 1 min) than its classroom-level counterpart. For every 10 min per day above the mean of TCM, code-focused, student-level activities students received, their alphabet score increased by almost 3 letters by spring, and, on average, this was the case for all students regardless of their fall alphabet score.

**Letter–Word Recognition**

Students who began the preschool year with lower letter–word recognition scores tended to demonstrate greater letter–word growth in classrooms that spent more time in TCM, code-focused, classroom-level activities, whereas students with higher letter–word recognition scores exhibited less growth (see Table 5 and Figure 5, middle). The opposite pattern was observed for amount of time spent in TCM, meaning-focused, classroom-level activities (see Table 5, bottom). Students with lower letter–word recognition scores in the fall demonstrated less letter–word growth in classrooms in which a greater amount of time was spent in TCM meaning-focused activities. In contrast, students with higher fall letter–word recognition scores demonstrated greater letter–word recognition growth when they participated in classrooms with greater amounts of TCM, meaning-focused, classroom-level activities.

**Vocabulary**

Although classroom-level activities systematically related to students’ vocabulary growth, student-level instructional activities had no significant relation. On average, students in classrooms that spent more time in TM, TCM, and CM, meaning-focused, classroom-level activities as well as CM, meaning-focused play, classroom-level activities showed stronger vocabulary score growth than did students in classrooms that spent less time in such activities, but there were Child × Instruction interactions (see Table 6 and Figure 6). Children with weaker fall vocabulary scores demonstrated less vocabulary growth when they spent more time in TCM, code-focused, classroom-level activities, whereas students with stronger fall vocabulary scores demonstrated greater growth.
vocabulary growth when they spent more time in such activities (see Table 6 and Figure 6, top). In general, all students achieved greater vocabulary growth in classrooms that spent more time in CM and TM, meaning-focused, classroom-level activities, regardless of fall vocabulary score. More time in TCM, meaning-focused, classroom-level activities (see Figure 6, middle) and CM, meaning-focused play, classroom-level activities (see Figure 6, bottom) was related to greater student vocabulary growth, but students with lower fall vocabulary scores demonstrated greater growth in classrooms with more time in such activities than did students with higher fall vocabulary scores. Overall, students with lower fall vocabulary scores exhibited greater vocabulary growth only when they experienced more time in TCM, TM, and CM, meaning-focused, classroom-level activities, including play, whereas students with higher vocabulary scores demonstrated stronger vocabulary growth, with more time spent in TCM code-focused activities and/or TCM, TM, and CM, meaning-focused, classroom-level activities.

Discussion

This study examined the nature of specific preschool activities in which teachers and children engaged and the relation of these activities to preschoolers’ alphabet, letter–word recognition, and vocabulary growth. Our discussion focuses on two key findings: (a) There was substantial variability in the amounts and types of language and literacy activities children experienced, and (b) these activities systematically related to preschoolers’ language and emergent literacy skills in a complex, interactive fashion.

Variability in Amount and Type of Instruction

Although, overall, these preschool classrooms would be judged high quality on the basis of the teachers’ credentials and years of experience, teacher–child ratios, physical facilities, and certification, there was substantial variability across and within classrooms in the amount and type of language and literacy learning opportunities offered to students. One class spent almost 90 min in language and literacy activities, including play, whereas another spent only 4 min. Thus, children, even in the same school district, had widely different preschool language and literacy experiences.

Classrooms met anywhere from 2 to 5 days per week and from 3 to 6 hr per day. Children who attended preschool for more hours per week demonstrated stronger alphabet and letter–word growth, overall, than did children who attended for less time per week.

Figure 5. Predicting spring letter–word recognition. Top: Student Fall Vocabulary × Overall Amount (hours per week) interaction effect on fitted spring letter–word recognition scores. Higher fall vocabulary scores (boldface line) fall at the 75th percentile for the sample, whereas lower fall vocabulary scores fall at the 25th percentile of the sample. All other variables are centered at their sample mean. Middle: Student Fall Letter–Word Recognition Score × Amount (minutes per day) of TM, Code-Focused, Classroom-Level Instruction. Bottom: Student Fall Letter–Word Recognition Score × Amount (minutes per day) of TM, Meaning-Focused, Classroom-Level Instruction. Higher fall letter–word recognition scores (boldface line) fall at the 75th percentile for the sample, whereas lower fall letter–word recognition scores fall at the 25th percentile of the sample. All other variables are centered at their sample mean. TM = teacher managed; TCM = teacher–child managed; CF = code focused; cl = classroom level.
Moreover, this difference was stronger for students who knew fewer letters and had weaker vocabulary scores at the beginning of the school year than it was for students who began the school year with stronger skills. This finding supports research demonstrating that greater amounts of time per week in high-quality preschool overall (i.e., intensity; Nelson et al., 2003) is related to stronger outcomes for preschoolers.

In a few classrooms, there was virtually no focus on language and emergent literacy, either explicit or implicit, whereas in other classes, the entire day was filled with meaningful opportunities for children to engage with written text and oral language. It is interesting to note that there was also appreciable variability in language and literacy activities, including play, within classrooms. Children in the same classroom at the same time were experiencing different learning opportunities. Some children experienced predominately nonliteracy learning opportunities (e.g., art or transition), whereas others spent substantial amounts of time in explicit and implicit literacy activities. These findings are important because language and literacy activities related to children’s vocabulary, alphabet, and decoding skill growth. This kind of variability has been observed in other preschool classrooms (NICHD ECCRN, 2003; Whitehurst, Epstein, et al., 1994).

Multiple Dimensions of Instruction and Student Outcomes

The types of language and literacy activities preschoolers experienced, when viewed multidimensionally, related to their language and literacy skill growth.

Meaning Focused Versus Code Focused and Explicit Versus Implicit

Overall, explicit code-focused activities predicted alphabet and letter–word growth, whereas explicit meaning-focused activities predicted vocabulary growth. This finding directly parallels findings for parent and home literacy involvement in children’s literacy development (Senechal & LeFevre, 2002). Formal or explicit code-focused parent–child interactions are related to children’s growth in emergent reading, whereas informal or implicit code-focused (i.e., meaning-focused) interactions related to growth in vocabulary and language skills.

However, the specificity was most evident for children who started the school year with weaker skills for whom only amount of explicit code-focused activities positively related to growth in their letter–word skills. For children with stronger fall letter–word skills, both code-focused and meaning-focused activities contributed to their letter–word growth. A similar pattern was observed for vocabulary—only meaning-focused activities positively predicted vocabulary growth for children with weaker fall vocabulary skills, whereas both code- and meaning-focused activities related to vocabulary growth for children with stronger fall scores. These findings may offer one possible reason that reading and vocabulary skills are observed to be highly stable, especially after kindergarten (Hart & Risley, 1995; Lonigan, Burgess, & Anthony, 2000). Children with stronger language and emergent literacy skills may have more opportunities to learn during both code- and meaning-focused activities (Tuyay, Jennings, & Dixon, 1995), which may contribute to the Matthew effect (Stanovich, 1986). The practical implication is that children with weaker skills need more, not

<table>
<thead>
<tr>
<th>Child fall score status outcome</th>
<th>Alphabet</th>
<th>Letter–word recognition</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom level (minutes/day)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCM–code focused</td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>TCM–meaning focused</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TM–meaning focused</td>
<td>.06</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>CM–meaning focused</td>
<td>.16</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>CM–meaning focused play</td>
<td>+</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Student level (minutes/day)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCM–code focused</td>
<td>.28</td>
<td>.28</td>
<td>.12</td>
</tr>
<tr>
<td>TM–CM–meaning focused</td>
<td>–.008</td>
<td>–.008</td>
<td></td>
</tr>
<tr>
<td>CM–code focused</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CM–meaning focused</td>
<td>.16</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td>CM–MF play</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Exact effect size depends on the amount of instruction and, when there is an interaction, the students’ fall scores. Unless there is a significant Child \times Instruction interaction, effect sizes are for 1 min per day, above the sample mean for students whose fall scores lie at the mean for the sample. For Child \times Instruction interaction effects, + indicates generally positive effect, ++ indicates relatively more positive effect, – indicates generally negative effect, and 0 indicates no significant effect for amounts of instruction or overall amount above the sample mean. Please refer to the interaction graphs (see Figures 4–6) for more precise estimates. All effects are significant at p < .05. TCM = teacher–child managed; TM = teacher managed; CM = child managed.
fewer opportunities to gain critical language and emergent literacy skills in preschool through explicit targeted experiences.

Play, an implicit meaning-focused activity, positively contributed to children’s vocabulary growth but was not associated with the code-focused outcomes, alphabet or letter–word recognition. This finding runs counter to claims that play directly supports children’s emergent literacy (Rowe, 1988) if language and emergent literacy are considered two discrete constructs (Lonigan et al., 1999; NICHD ECCRN, 2005; Senechal & LeFevre, 2002). The amount of time children spent in play did predict vocabulary growth, which makes sense as one considers the language development implications of symbolic play (Pelligrini & Galda, 1993) and peer interactions. Thus, play appears to relate to preschoolers’ emergent literacy growth indirectly through its relation with vocabulary growth.

An intriguing finding is that the positive association between play and vocabulary growth was greater for children with weaker fall vocabulary skills than it was for children with stronger vocabulary skills. It is possible that interactions during dramatic play with more able peers and with the teacher may have supported students’ vocabulary growth. It may also be that children with strong fall vocabulary skills already had the core vocabulary made available in the dramatic play centers, for example, whereas for children with weaker vocabulary skills, these experiences provided access to vocabulary not available to them previously through home or child-care literacy experiences. Another possible explanation may be that because the rate of vocabulary development is highly variable among children during the preschool years (Locke, 1997; Scarborough, 2001), children with weaker vocabulary skills in the fall may have just started the documented burst of vocabulary development (Bates, 1999; Fenson et al., 1993; Scarborough, 2001). Opportunities for play may have offered additional support for their vocabulary development leading to greater growth. Children with stronger fall vocabulary skills may have completed this developmental burst, and thus play had a less evident effect on their vocabulary growth. More research is needed.

### Classroom-Level Versus Student-Level Instruction

Although student-level instruction did not relate to preschoolers’ vocabulary growth, whole-class instruction did. Both classroom- and student-level instruction were positively related to alphabet and letter–word growth. Whole-class, rather than small-group–individual, meaning-focused activities may have provided more opportunities for students to interact with peers in meaningful ways, offering a bridge to more complex vocabulary and syntax (Wharton-McDonald, Pressley, & Hampston, 1998), which would tend to support vocabulary development. It is also possible that this finding is an artifact of our naturalistic observational procedures. With the exception of play, most of the language and emergent literacy instruction was classroom level, and most of this was

![Figure 6](image-url)

**Figure 6.** Top: Predicting spring vocabulary. Student Fall Vocabulary Score × Amount (minutes per day) of TCM, Code-Focused, Classroom-Level Instruction. Middle: Student Fall Vocabulary Score × Amount (minutes per day) of TCM, Meaning-Focused, Classroom-Level Instruction. Bottom: Student Fall Vocabulary × Amount (minutes per day) of Child-Managed/Meaning-Focused Play, Classroom-Level Instruction.

Higher fall vocabulary scores (boldface line) fall at the 75th percentile for the sample, whereas lower fall vocabulary scores fall at the 25th percentile of the sample. All other variables are centered at their sample mean. TCM = teacher–child managed; CF = code focused; cl = classroom level; MF = meaning focused.
meaning focused. There may not have been sufficient variability in student-level, explicit meaning-focused instruction within classrooms to detect effects on vocabulary.

With regard to preschoolers’ alphabet and letter–word skill growth, overall, student-level instruction yielded a much larger effect size, almost tenfold, for children’s alphabet and letter–word recognition skill growth than did whole-class instruction (see Table 7). Moreover, although there were Child × Instruction interactions at the classroom level, there were none at the student level. Thus, instructional strategies provided in small-group–individual settings were related to greater alphabet and letter–word skill growth for all children, regardless of their entering skill level, in contrast to whole-class activities. Small-group–individual instruction and providing extra help to school-age children who need it are hallmarks of effective teachers (Wharton-McDonald et al., 1998), and these results appear to support these findings for preschool-age students. It may be that small-group–individual settings are more conducive to implementing effective instruction. In these settings, teachers who are cognizant of their students’ academic strengths and weaknesses may be better able to individualize instruction, targeting instructional strategies to each student’s needs, including providing more time for those who need it.

**TCM, TM, and CM Instruction**

TM, TCM, and CM activities were all positively associated with vocabulary growth, whereas only TCM activities were associated with alphabet and letter–word growth. These findings reinforce current notions about the differing sources of language versus literacy development (Geary, 1995; Snow, 1983). Language acquisition is universal across cultures and appears to be learned implicitly through interactions with others—teachers, parents, and peers. In contrast, reading varies across cultures and must be explicitly taught to most children. Thus, according to our findings, the active involvement of the teacher with the students was important for alphabet and letter–word growth.

**Limitations**

There are limitations to our study and hence to our interpretations. First, we videotaped only 1 day of instruction and although these videotaped observations appeared to align with more frequent informal observations, still, they provided only a snapshot of the activities the preschoolers experienced. Second, we examined the amount and type of preschool emergent literacy activities multidimensionally but did not describe how this instruction was implemented beyond attempting to capture the extent to which teachers and children interacted during the activity. How these activities are implemented, the degree to which the teacher is organized and clear in her or his instruction, and her or his warmth and sensitivity to students, among others, are nonetheless important predictors of child outcomes that we did not consider (NICHD ECCRN, 2002, 2003, 2004) but will in future studies.

Third, the present study design does not permit strong causal inferences. We used naturally occurring variation in teachers’ practices and students’ characteristics to identify the correspondence between classroom instruction and student outcomes. Thus, other unmeasured variables may have been responsible for the effects we documented. For example, preschool experiences may have had nominal effects for students who began the year with strong vocabulary and emergent literacy skills. Rather, their parents and the home literacy environment provided may have been responsible for their language and literacy development. Additionally, we did not take into account nonacademic classroom practices (like organization) or child social outcomes (such as self-regulation), which, research indicates, contribute to the classroom environment and student outcomes (Cameron, 2004; McClelland & Morrison, 2003). Ultimately, rigorous intervention studies with random assignment of participants to treatment and control are needed to make strong causal claims.

**The Role of Explicit Instruction and Play in Preschool**

There is a diversity of beliefs about teaching preschoolers how to read (Bowman et al., 2001; Bredekemp & Copple, 1997; Connor, 2002; Graue et al., 2004; Roskos & Christie, 2000; Stipek et al., 1995). Our results, along with other preschool research (Graue et al., 2004; Whitehurst, Epstein, et al., 1994), support the idea that explicitly teaching students letters, letter sounds, phonological decoding, and phonological awareness, in conjunction with rich meaning-focused experiences, including play, may yield stronger student outcomes than programs that focus solely on one to the exclusion of the other. Explicit code-focused activities, in which teachers and students work together, may be especially important for students with weaker literacy skills at the beginning of the year. On the basis of our observations of the classrooms in this study, these explicit code-focused activities were consistently delivered in interactive and supporting ways. No drilling of students’ skills or long time spent completing worksheets was observed. Rather, alphabet and letter–sound activities, for example, were embedded in songs, craft activities, and games. Opportunities to practice these skills were provided in dramatic play centers (e.g., reading menus or writing a prescription when pretending to be a doctor), although, our results suggest that, relative to emergent reading development, the greater potential benefit to students provided through play is in vocabulary development.

Explicit meaning-focused activities contributed significantly to students’ decoding and vocabulary growth as well. Thus, reading to children, sharing, discussion, and other meaning-focused activities found in high-quality preschool programs should not be abandoned in favor of an exclusive focus on code-related activities.

Our results reveal that the impact of selected patterns of instruction—particularly when provided in whole-class settings—may depend on preschoolers’ entering vocabulary and emergent reading skills. Thus, designing effective instruction for all children, particularly in light of the substantial heterogeneity across and within preschool classrooms, may prove challenging. One suggestion for practice may be to provide explicit and implicit meaning-focused activities primarily in whole-class settings, in which their impact appears to be greater on students’ vocabulary growth. In contrast, another suggestion is to provide emergent code-focused activities in small-group settings in which they can be tailored for each student on the basis of their vocabulary and emergent reading.

Additionally, no CM code-focused activities related to student outcome growth, but TCM code-focused activities did. This suggests that explicit code-focused instruction might be more effective when teacher and students interact with each other, whereas
children working alone on phonics worksheets, for example, should be avoided. All of this would need to be tested. Efforts are underway to develop appropriate literacy-based preschool curricula. These data were collected in classrooms that used one preschool curriculum. Indeed, other curricula might provide alternative patterns of experience for children and generate different student outcomes. More research regarding the efficacy of such efforts to improve students’ short- and long-term literacy outcomes using randomized field trials, such as the Individualizing Student Instruction project (Connor & Morrison, 2006), is warranted.

Research Implications

As we strive to define high-quality preschool experiences, these results reveal that what might be considered high quality for a typically developing child or a preschooler with stronger vocabulary and decoding skills may differ substantially from a high-quality preschool experience for a preschooler at risk for underachievement because of poverty or other risk factors. Students at risk typically begin preschool with weaker vocabulary and emergent literacy skills (Hart & Risley, 1995; Snow et al., 1998). Observing preschool classrooms across multiple dimensions and measuring the effectiveness of preschool experiences in improving students’ cognitive and social outcome growth may offer more precise metrics of quality than a focus solely on more global curriculum-level measures (e.g., teacher directed vs. child centered) and resources (staff/child ratios).

The video-coded classroom observation methods utilized in this study demonstrate that systematic, multidimensional, and multi-level examination of classroom participants (teachers and students) and the activities in which they engage are both feasible and important. As our results show, children in the same classroom do not experience the same amounts and types of language and literacy activities. This kind of analysis would not have been possible without new technology—both statistical (e.g., HLM) and observational (video and software). Although still expensive and time consuming, the technology is continuing to improve. Achieving a detailed understanding of exactly what is occurring in classrooms, rather than continuing to treat this important proximal influence like a “black box,” appears to be worth the time and expense, especially given society’s real and potential investment in preschool interventions (Gormley, Gayer, Phillips, & Dawson, 2004; Sawhill, 1999) and new universal prekindergarten initiatives (e.g., Florida).

The children in this study represent a more diverse sample than is found in many preschool studies (e.g., Conyers et al., 2003; Reynolds et al., 2004). For example, 5% of our sample attended Head Start classrooms and the rest attended fee-for-service classrooms, parent educational levels ranged from less than high school to advanced degrees, and fully 10% of the children spoke a language other than English at home. This should be kept in mind as these results are interpreted. A more homogenous sample (e.g., only children enrolled in Head Start) would certainly have yielded very different results. Indeed, finding Child × Instruction interactions may have been related to having a more diverse sample. We consider this a strength of this study, especially as policymakers call for universal prekindergarten and expanded preschool experiences for all children (Disimone, Payne, Fedoravicius, Henrich, & Finn-Stevenson, 2004; Saluja, Early, & Clifford, 2001; Sawhill, 1999; Snow et al., 1998). Preschool research that moves beyond a specific focus on children at risk for academic underachievement offers the opportunity to better understand how to deliver effective preschool instruction to all children and the underlying causal mechanism of the benefits associated with high-quality preschool experiences.

In summary, this study examined more closely the language and literacy activities preschoolers experienced in their classrooms and the relation of these experiences to their alphabet, letter–word recognition, and vocabulary development. Our purpose was to begin to elucidate the underlying causal mechanisms of the clearly documented benefits of high-quality preschool experiences on students’ later academic success. Part of students’ growth in alphabet, letter–word recognition, and vocabulary observed in this study was explained by the vocabulary and early reading skills they brought to the classroom. These were, presumably, a result of home, sociocultural, and other life experiences prior to the beginning of the school year (Bronfenbrenner, 1986; Morrison et al., 2005). However, specific and identifiable language and literacy activities children experienced in the observed classrooms also predicted alphabet, letter–word recognition, and vocabulary growth, controlling for fall achievement and other child, teacher, and classroom characteristics. This is encouraging because how teachers and students interact and the kinds of language and literacy experiences children encounter in preschool classrooms can be modified and improved. Designing effective preschool language and literacy instruction—taking into account that the effect of language and literacy activities are fairly specific and may depend on each student’s skills—has the potential to improve short-term and, potentially, long-term academic achievement for all children.

References


Appendix A

Excerpts from the Pathways to Literacy Coding Manual

General Description

This coding scheme for classroom- and student-level activities is a modified form of the coding scheme used in previous studies and was designed to follow children from preschool through first grade. For this reason, some activities are described that were not observed in the preschool classrooms in this study. Codes are hierarchical and begin with general areas (activities), such as ritual, language arts, or math. For each general area, there is a list of subactivities that describe the behaviors in more detail, such as teacher read-aloud or student independent reading. All of these activities are considered states, that is, they have a duration and the relevant unit of analysis is the time (in minutes or seconds) that participants spent in them. Activities may be either instructional or noninstructional. (Note that the following are excerpted. Please contact Carol McDonald Connor for the complete coding manual.)

Classroom Versus Student Level

These activity codes can be applied to the whole class (when everyone in the class is engaged in basically the same activity—classroom-level activity) or to individual target children (when different children in the class are engaged in significantly different activities; for example, they may be in different small groups—student-level activity).

Teacher Managed (TM) Versus Teacher–Child Managed (TCM) Versus Child Managed (CM)

All instructional activities can be further specified as TM, assistant TM, TCM, or CM and also as whole class (classroom level), small group, or individual.

TM activity. This is an activity in which the teacher (or aide) is focusing the students’ attention, and the children are doing very little talking. A good example would be the teacher reading aloud to the students without discussion. If the teacher is encouraging the students to talk (e.g., using questions, probing for knowledge), then this is a TCM activity (see below).

TCM activity. TCM instruction includes activities in which the teacher or the assistant teacher is the primary director of the children’s attention but in which children are active participants (e.g., teacher and student discussions surrounding a particular book). Other TCM activities include teachers reading aloud with discussion and instruction in letter–sound relations. These can be directed toward the whole class, small groups, or individual children.

CM activity. CM instruction includes those instructional activities in which the student is primarily controlling his or her focus of attention, for example, reading independently (e.g., sustained silent reading) and completing worksheets independently. These activities can be conducted in small groups or individually. Peer activities are included under this code. However, they are considered separated in the revised version of this coding scheme.

Activities

Play–Free Time

Time spent engaged in activities of the students’ choice that are not specifically literacy or other content area (e.g., math, science) focused. Typically this includes time spent in the dramatic play area, playing with blocks, building with LEGO® s, playing housekeeping, and the cooperative

(Appendices continue)
peer interactions that occur during play. It is distinct from time spent looking at or reading books (which is coded as sustained silent emergent reading), games, art, music activities, and recess (which typically occurs outside the classroom and is not coded). In all cases, these activities are CM.

**Language Arts**

Time spent engaged in activities that require reading, writing, or reading- and writing-related things but that are not focused on gaining information about another content area (science, social studies, math, drama, etc.). Remember that text is anything that can be read, including signs, labels, directions on the board, and so forth. Print, on the other hand, refers to printed matter such as books, newspapers, and so forth. Specific subactivities follow.

**Teacher read-aloud.** The teacher reads from a picture book, a chapter book, or magazine, and so forth; provides a book-on-tape for the class to listen to (children are not under headphones); or shows a video wherein a story is presented and is present during the activity (otherwise it is a CM activity). The read-aloud is done from beginning to end, without breaks to discuss or ask questions. However, the teacher may make brief clarification comments (especially during a book-on-tape) or ask rhetorical questions, without really expecting a response from the children.

**Teacher read-aloud–discussion combination.** The teacher reads a book out loud but stops frequently (once every one or two pages) to discuss or ask questions. This occurs during the reading of the book and is clearly interactive, with both the teacher and the children participating in reading and understanding the book.

*Think of teacher read-aloud and the teacher read-aloud–discussion combination as two different styles of reading a book. Some teachers like to go from beginning to end, and others like to stop along the way and discuss. Rarely will the same book-reading activity be coded for both of these styles.*

**Student read-aloud, individual.** A single child reads aloud, in a small group or whole class, from a picture book, chapter book, magazine, or his or her own writing. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Student read-aloud, choral.** More than 1 child reads aloud from a picture book, chapter book, magazine, poster, and so forth. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Silent sustained reading.** Children sit quietly and read to themselves. In preschool, this may include emergent reading and looking at pictures. What is important is that children are interacting with books independently.

**TM group writing.** The teacher is at the blackboard–easel, working with children on a group writing activity. Children offer the content of the written piece, but the teacher puts the ideas into complete sentences, with appropriate punctuation and so forth.

**Writing instruction.** The teacher tells the children how to do things that will help them to become independent writers, such as how to engage in advanced organizing (e.g., webbing, outlining), how to move from outline to written product, and how to proofread and edit. This also includes instruction in the different forms of writing (expository vs. demonstration, etc.). At the preschool level, this will include invented spelling activities. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Teacher model writing.** The teacher, without input from the children, stands at the blackboard–easel and produces some sort of written product (depending on the level of the students, it could be as small as a sentence). The intent of the writing must be to model the act of writing and an appropriate product. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Student group writing.** The children are working in pairs or small groups to produce a written product (such as a story). Not all of the children will actually be doing the writing, but they should be engaged in discussions about what will be written. Writing may include invented spelling and other emergent writing activities.

**Student independent writing.** Children are quietly writing a story, poem, or journal entry by themselves. Writing may include invented spelling and other emergent writing activities.

**Handwriting practice-instruction.** Children are doing an activity intended to help improve their handwriting, or they are receiving instruction in good handwriting skills.

**Spelling.** Children are taking a spelling test, copying words, or being asked to spell words (without seeing the word). (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Reading comprehension activity.** These activities apply both to material children have read to themselves and material read to them. Children are completing worksheets related to material or are writing in response to something they have read or heard. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Reading comprehension strategies: TCM.** This applies both to material children have read to themselves and material read to them. The teacher describes or models specific strategies such as summarization, predicting, inferring, monitoring comprehension, and relating story to self. This includes explicitly teaching children strategies to enhance active construction of meaning from text—either read aloud or silently. In addition, children are asked to recall details about a story that has been read to them. Specific questions from the teacher about the story or elements of the story are also reading comprehension strategies.

**Reading comprehension strategies: CM.** Children read in small groups and discuss material they have read or that has been read to them. It is the CM counterpart to reading comprehension strategies. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Discussion.** Children are previewing a book the teacher is about to read or reviewing a storyline from a book the teacher has read aloud. Children are responding to and asking questions of both each other and the teacher. Discussion is more reciprocal and interactive than reading comprehension strategies and does not involve explicit–implicit teaching of comprehension strategies.

**Alphabet activity.** Children are engaged in learning the names of the letters or focusing their attention on a particular letter of the alphabet. For example, they might have to make a letter out of clay, color a paper that shows a particular letter and items that begin with that letter, or put their body in the shape of a letter.

**Initial consonant.** Children are identifying the beginning (initial) consonant sound of words, aurally and not visually. If the activity is visual and aural, then code the activity as letter sight–sound. An example of initial consonant is when the teacher asks “What letter does the word Valentine begin with?” If she has children say Valentine without the v, that is word segmentation.

**Letter sight–sound.** Children are engaged in activities that focus their attention on the relationship between the written form of individual letters and the sound those letters represent. Included here are activities such as “signs for sounds” wherein the teacher orally produces a single letter sound, and the children circle the letter (from an array of letters on a prepared paper) that represents that sound. This subactivity must combine the written form and oral sounds that represent the written form. If no written form is used, then the activity is more appropriately coded as initial consonant or word segmentation. Identifying individual letters embedded in a word (such as spelling February while looking at the word) is also letter sight–sound.

**Phonological awareness.** Activities that focus on the sounds of the English language, including rhyming games and songs. This should be coded when phonological awareness appears to be the only purpose of the activity. A rhyming song such as “Five Little Monkeys Jumping on the
Bed” would not be coded as language arts, subactivity phonological awareness, because the main purpose of the song is related to mathematics.

**Word segmentation.** Children are engaged in activities wherein they break words into subcomponents (syllables, subsyllables, or phonemes), orally; or they are charged with constructing whole words from orally presented word segments. Included here are activities such as learning word families (children are presented with a rime and must find onsets that make real words; this is often an oral–written activity, but the initial response is oral). For an activity to be coded as word segmentation rather than letter sight–sound, the intent of the activity should be at the word level and not the letter level.

**Vocabulary.** The teacher and/or children are discussing the meaning of a word(s) or phrase (for longer than the 15-s interval).

**Conventions of print.** Conventions of written text such as where to start reading, reading from left to right or anything related to directionality, upper- and lowercase, identify punctuation symbols, talk about what–who author and illustrators are.

**Grammar and punctuation.** The children are engaged in activities focused on grammar or punctuation. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Computer.** Children are working at the computer with a language arts-oriented software, and the intent is unclear. Where possible, time spent at the computer is coded as the intent of the computer-based activity (e.g., for accelerated reader, children answer reading comprehension questions about specific books to earn points—this would be coded as reading comprehension activity rather than computer). Note that this is currently coded as CM. (Note that although the description is provided, this activity was not observed in the target preschool classrooms.)

**Sharing with class.** Students or the teacher talk about personal business to the group. Code for sharing not only during “show and tell” or a formal sharing activity but also when the class is in a circle just chatting with the teacher. Sharing should include both teacher and student input, and it should be clear that both expect the other to speak in a reciprocal way. A child who bursts out with news from home during calendar is interrupting, unless the teacher takes that opportunity to ask whether other children have things to share and continues the conversation with the class.

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**Appendix B**

**Description of Hierarchical Linear Models and Exemplar Model**

Level 1

\[ Y_{ij} = \beta_0 + \beta_{10} (\text{fall letter-word})_i + \beta_{11} (\text{fall vocabulary})_i \\ + \beta_{12} (\text{fall alphabet})_i + \beta_{13} (\text{boy})_i + \beta_{14} (\text{Head Start-state})_i \\ + \beta_{10} (\text{student-level instruction variables})_i + u_{ij} + \epsilon_{ij} \]

Level 2

\[ \beta_{10} = \gamma_{10} + \gamma_{10} (\text{total hours/week}) \\ + \gamma_{10} (\text{classroom-level instruction variables})_i + u_{ij} \]

\[ \beta_{11} = \gamma_{11} \]

\[ \beta_{12} = \gamma_{12} + \gamma_{11} (\text{classroom instruction variables})_i \]

\[ \beta_{13} = \gamma_{13} \]

\[ \beta_{14} = \gamma_{14} \]

\[ \beta_{15} = \gamma_{15} \]

\[ \beta_{16} = \gamma_{16} \]

\[ \gamma_{10} \text{, which is the spring letter-word recognition score for child } i \text{, is a function of the respective coefficients } (\beta_j) \text{ at Level 1 as they pertain to child } i \text{’s fall vocabulary, letter-word recognition, and alphabet scores; age; and minutes of small-group–individual instruction types as well as a residual } (\epsilon_{ij}), \text{ } \beta_{10} \text{ is a function of the fitted mean spring letter-word recognition score for the sample of students } (\gamma_{10}) \text{ plus the effect of the total hours per week and the whole classroom instruction variables for classroom } j, \text{ plus error } (u_{ij}). \gamma_{10} \text{ represents the effect of fall vocabulary on spring reading comprehension.} \gamma_{11} \text{ represents the effect of fall alphabet score, and } \gamma_{12} \text{ represents the effect of child age on spring letter-word score; } \gamma_{13} \text{ represents the effect of enrollment in a preschool intervention on spring letter-word score; } \gamma_{14} \text{ represents the effect of amount and type of small-group–individual instruction; } \gamma_{15} \text{ represents the interaction between classroom-level instruction variables and student fall letter-word recognition score. The error at the level of the classroom is represented by } u_{ij}. \text{ Residuals } (u, r) \text{ were assumed to be normally distributed with a mean of zero.} \]

Hierarchical linear modeling results are interpreted in much the same way as regression results. Referring to Table 5, \( \gamma_{10} \) represents the fitted mean letter-word score (345.64). The other gamma (\( \gamma \)) coefficients represent the effects of the particular independent variables (e.g., fall vocabulary score, fall alphabet score, etc.) and interactions (e.g., effect of TCM, Code-Focused, Classroom-Level Activity × Fall Letter–Word Score, \( \gamma_{11} \)). The \( t \) tests identify which effects are significantly greater or less than zero. For example, \( \gamma_{10} \) represents the effect of overall hours per day spent in preschool. The value .44 indicates that for every hour per week students are in preschool, on average, their letter-word score will be .44 points higher than a student in preschool the average number of hours per week. The \( p \) value (<.001) indicates that there is a 99% chance that this value is greater than zero. This indicates that children who spend 25 hr per week in preschool (10 hr above the mean of 15) will achieve letter-word scores 4 points higher, on average, than will students who attend preschool for the mean amount of time, 15 hr per week. The implications of interaction coefficients (e.g., \( \gamma_{11} \)—effect of TCM, Code-Focused, Classroom-Level Activity × Fall Letter–Word Score) are best understood by referring to the figures.