The Construction of Instructional Interventions: Principles for Accelerating the Vocabulary Development and Comprehension of Children in Low-Income Households

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It is now more than 40 years since Lyndon Johnson declared a national War on Poverty. From 1964-1968, the United States launched national education programs, such as Head Start, that continue today and have improved the preparedness of many economically disadvantaged preschool children. Although mixed, the results are promising (Chambers, Cheung, & Slavin, 2006; National Research Council, 2000): Long-term outcomes of participating in Head Start and other preschool programs include fewer grade repetitions, greater probability of high school graduation, higher lifetime earnings, and reduced incidence of criminal behavior (Garces, Duncan, & Currie, 2002). These hard-fought battles and improved outcomes notwithstanding, the war on poverty has not been won.

According to a report from the 2005 UNICEF Innocenti Research Center (UNICEF Innocenti Research Center, 2005), the United States ranked 23rd among 24 of the richest nations in the world in terms of the proportion of children living in poverty. Within the United States, findings from the Children's Defense Fund documented almost 37 million people living in poverty in 2004 with 13 million of them children (Children's Defense Fund, 2005). Further, nearly one in five American children lived below the poverty line in 2004 (Ryan, Fauth, & Brooks-Gunn, 2006), and more than 21 percent of America's children live in "extreme poverty" households with incomes of less than half of the national median income (Children's Defense Fund, 2005; UNICEF Innocenti Research Center, 2005).

The costs of poverty are manifold . Childhoods lived in poverty can have pernicious effects, placing children at high risk due to economic stress that negatively impacts relationships and interactions, and economic deprivation that limits resources available for goods, services, and time that facilitate children's development (Ryan et al., 2006). Among the most insidious costs of a childhood lived in poverty are unrealized and under-realized academic and educational outcomes.

Although the reduction of poverty is generally not the direct province of educators, intercepting and altering the potential negative outcomes associated with poverty are. Thus, enhancing academic achievement through quality instruction and attenuating the impact of growing up in low-income homes and neighborhoods should be the explicit mission of educators.

The National Research Council's Committee on Integrating the Science of Early Childhood Development (2000) reported that relative to nonpoor children, children of poverty are two times more likely to repeat a grade and drop out of high school and 1.4 times more likely to be diagnosed with a learning disability. Results of the 2005 National Assessment of Educational Progress (NAEP) in reading further reinforce the role that poverty exercises on achievement. That is, fourth and eighth-grade students who were eligible for free or reduced-cost lunches scored markedly lower than peers who were not eligible, an established and stable trend among NAEP findings (National Center on Educational Statistics, 2005). Further, students from historically disadvantaged minority groups (American Indian, Hispanic, Black) have little more than a fifty-fifty chance of finishing high school with a diploma (Swanson, 2004). With graduation odds no better than 50/50, and adult literacy skills markedly limited, socioeconomically disadvantaged students face seemingly insurmountable odds.

As educators, our goal must be to change the odds and outcomes associated with poverty. Longitudinal studies have yielded reliable evidence documenting that trajectories of academic achievement are established early in a child's educational experience. For example, findings of a recent study sponsored by the National Center for Educational Statistics underscored the important academic foundation laid in kindergarten, particularly for children with identified risks (West, Denton, & Reaney, 2001). Of perhaps even greater import and implication is the converging evidence documenting the long-term predictive power of a child's academic skills at school entry and the linkage between socioeconomic class and achievement across the grades. Ryan, Fauth, and Brooks-Gunn (2006) reported that cognitive performance in children raised in poverty diverges from nonpoor children's performance as young as 2 years of age, continues at school entry, and impacts school performance through high school. Likewise, the National Research Council (2000) concluded that the association between "economic hardship and compromised child development" (p. 275) is one of the most constant and consistent findings in developmental science.

Emerging research findings from research by Greg Duncan and colleagues (cited in National Research Council, 2000) sheds further light on the poverty-educational development association, indicating that the impact of poverty is not equal per unit of time. Specifically, poverty exacts greater costs on children during the preschool years than later years of schooling (Evans, 2004). This finding suggests that preschool instructional practices and processes may be especially important (Burchinal, Pianta, & Howes, 2002).

A plausible solution to changing the low poverty-low academic achievement odds is early intervention, specifically high-quality instruction during that critical period. In this chapter, after

an overview of the impact of poverty on cognitive and language development, we focus on early intervention and the role of instructional design in accelerating vocabulary, concept knowledge, and comprehension development of preschool children from low-income homes.

Impact of Poverty on Language Development

In young children, the costs of poverty and disadvantage manifest themselves in meaningful differences in language and literacy development. Specifically, findings document significant discrepancies between poor and nonpoor children in their (a) quality and quantity of vocabulary (Hart & Risley, 1995); (b) proficiency with phonemic and alphabetic skills required for reading (West, Denton, & Reaney, 2001); and (c) depth and breadth of background knowledge necessary for reading comprehension (Hirsch, Willingham, & Neuman, 2006).

The past two decades of research provide replicated findings that have advanced our understanding of the relationship between poverty and language development. While a comprehensive review of the literature is beyond the scope of this chapter, in the following, we summarize the environmental and experiential risk factors associated with poverty and profile language disparities found to exist between children of low-income and higher-income households.

Environmental and Experiential Risks of Low-Income Households

Compared to wealthier children, children from low-income households often experience:

- Substantially less cognitive stimulation and enrichment (Evans, 2004)
- Limited opportunities to engage in literary activities with parents (Evans, 2004; Hart & Risley, 1995)

- Poorer quality, quantity, and responsiveness of parental verbalizations (Hart & Risley, 1995)
- Impoverished home learning environment (literacy materials, library use, reading to children) (Duncan & Brooks-Gunn, 2000)
- Shorter utterances of parental speech (Hart & Risley, 2003; Hoff, 2003)
- Impoverished learning resources and experiences (e.g., fewer visits to libraries, museums) (Bradley et al., 2001; Corwyn, McAdoo & Garcia Coll, 2001)
- Less exposure to print media (Neuman & Roskos, 1993)
- Less qualified teachers and poorer instruction (Cirino, Pollard-Durodola, Foorman et al., in press).

Language and Literacy Disparities of Children from Low-Income Households

Often associated with these environmental and experiential risks for children from low-income families are disparities in language development that include:

- Significant receptive and expressive vocabulary and language disparities (Hart & Risley, 1995) that without intervention remain stable over time (Morrison, Frazier, Hardway, Griffith, Williamson, & Miyazaki, 1998)
- Limited background knowledge of concepts necessary to "connect" with text (Hirsch, 2006, Justice & Ezell, 2001, Neuman, 2006)
- Less coherent, cumulative knowledge of content necessary for sufficient depth of processing (Hirsch, 2006; Neuman, 2006, Willingham, 2006)
- Lack of well-developed oral language skills that lay foundation for literacy skills (Catts, Fey, Zhang, & Tomblin, 2001; Catts, Hogan, & Fey, 2003; Chaney, 1998; Metsala, 1999).

This summary of environmental and experimental risk factors related to language and literacy disparities make clear the challenges for concerned educators. A common denominator is the reality of "less"—less opportunity, less experience, less interaction, less coherence in the curriculum, and less knowledge of content and concepts, which limits the acquisition of more content and concept knowledge. A primary challenge for educators, therefore, is how to address the reality of "less" and accelerate learning rates for poor children who enter school with literacy and language levels significantly below those of their more advantaged peers. Simply stated, how do we design learning experiences that will close the experiential/opportunity gap that children from low-income households bring to school?

In this chapter, we address the economics of instruction, the premise of acceleration, and the significant role that principles of instructional design play in optimizing learning rates and development for children from high-poverty contexts. We then describe the application of these principles in the design and development of a book-based intervention for preschool children. This application illustrates how design principles were used to construct an instructional intervention to broaden and deepen prekindergarten children's knowledge of vocabulary, concepts, and text genres using books as a tool to jumpstart for reading comprehension.

Instructional Design Principles to Accelerate Language and Literacy Learning and Reduce Disparities

The theoretical framework that guides our efforts to accelerate learning and reduce language and literacy disparities is grounded in the intersection of Carroll's model of school learning and Engelmann and Carnine's (1991) theory of instructional design. More than four decades ago, Carroll (1963) proposed a model of school learning to address the problem of achievement disparities that was founded in the economics of instruction. Identifying time as the

most important variable to school learning, Carroll's simple equation indicated that school learning was a function of time spent over time needed.

School Learning = f(time spent/time needed).

Carroll explained that **time spent** is the result of **opportunity** and **perseverance**. Opportunity is a function of time allocated and learner perseverance of involvement with the academic content or engagement rate. Further, time needed is moderated by the **quality of instruction** and **learner aptitude** and **ability**. His premise was that the variables of opportunity to learn and quality of instruction are the direct province of educators and, if properly managed, can mediate the effects of learner variables (e.g., limited vocabulary, depressed cognitive development).

The instructional implication of Carroll's model for closing the language/literacy gap is that if instructional opportunities are maximized and students are highly engaged in high-quality instruction, more can be taught in less time (Becker, 1992). The amount of time needed for learning can be moderated by the quality of instruction. The interaction of opportunity to learn and quality of instruction have direct relevance for efforts to optimize learning among children with identified risks related to poverty.

Quality of instruction has many dimensions, but at the core are the teacher's experience and expertise and the design of instructional materials. Some evidence suggests that access to high-quality teachers who can provide effective instruction may be limited by geography and the poverty level of the school's population (Cirino, Pollard-Durodola, Foorman et al., in press). Therefore, quality of instructional design has been the centerpiece of our work and used to actually improve the quality of teachers' instruction.

A theory of instruction begins with the assumption that the environment is the primary variable in accounting for what the learner learns (Engelmann & Carnine, 1991, p. 3). A theory of instructional design, in turn, assumes that a primary variable in the environment is the instructional curriculum and materials that largely influence what is taught and learned. Specifically, the clearer and more robust the communication of information, the greater the likelihood a child will acquire that information. Engelmann and Carnine (1991) proposed that the greater the needs of the learner, the greater the responsibility of instruction. Therefore, for children who enter with "less," the quality of instructional design holds promise for acceleration of learning rates whereby children can actually learn "more." Therefore, high-quality instructional materials that focus on priority skills, scaffold task difficulty, and communicate information clearly and efficiently are indispensable for children who have so much to learn.

Forty years since the inception of this nation's War on Poverty's, children of poverty still enter our schools with lower levels of knowledge and skill than their more advantaged peers, a strong indication that they are at risk for reading difficulties (National Research Council, 1998). In fact, the proportion of children in low-income homes is increasing; hence also achievement disparities (Haycock, 2006). To effectively reduce achievement disparities and close the gap, we must accelerate learning.

To accelerate learning, we propose that we must attend to the architecture of instruction and the opportunities for learning inherent in those materials. Instruction that accelerates learning (a) begins during critical windows of preschool years, (b) maximizes learning time through high levels of relevant learner engagement, and (c) increases instructional quality through tested principles of instructional design. In the following, we describe the foundational design of instruction principles engineered and researched over the past four decades by Engelmann,

Carnine, Kame'enui, and colleagues. We then illustrate how these principles are applied in a new book-based reading intervention for preschool children.

Accelerating Learning Through Quality of Instructional Design and Language Interaction Opportunity

Instructional design refers to the way information in a particular domain (e.g., social studies, science, reading, mathematics) is selected, prioritized, sequenced, organized, and scheduled for instruction within a highly orchestrated series of lessons and materials that make up a course of study (Simmons & Kame'enui, 1998). According to Smith and Ragan (1993), instructional design refers to the "systematic process of translating principles of learning and instruction into plans for instructional materials and activities" (p. 2). As Smith and Ragan pointed out, "An instructional designer is somewhat like an engineer—both plan their works based on principles that have been successful in the past—the engineer on the laws of physics, and the designer on basic principles of instruction and learning" (p. 2).

The instructional designer is concerned with developing the architectural pedagogy for communicating symbolic information that has a high probability of preventing learner errors, misconceptions, and misrules (Tennyson & Christensen, 1986). Instructional design is concerned with the intricacies of analyzing, selecting, prioritizing, sequencing, and scheduling the communication of information before it is packaged for delivery or implemented. In other words, it is the behind-the-scenes activity that appears as the sequence of objectives, schedule of tasks, components of instructional strategies, amount and kind of review, number of examples, extent of teacher direction, and support explicated in teachers' guides and lesson plans. Instructional design, then, is the blueprint for instruction that carries significant potential support for students who may be at risk of learning difficulties. Some blueprints are skeletal, providing little

instructional specification; others have fundamental flaws that fail to provide an adequate foundation on which to build skills and support future learning success. To accelerate learning, we begin with the premise that carefully articulated and specified instructional design serves as the framework for increasing learning.

Instructional Design Framework

Our framework for designing instructional and curricular interventions was determined a priori and is based on a set of principles consolidated by researchers at the National Center to Improve the Tools of Educators at the University of Oregon (NCITE: Dixon, Carnine, & Kame'enui, 1992). The principles have served as the framework for commercial interventions such as the Early Reading Intervention (Simmons & Kame'enui, 2003) and as the blueprint for strategies across content areas (Kame'enui, Carnine, Dixon, Simmons, & Coyne, 2002). The curriculum design principles were derived from "numerous studies and investigations [that] have identified features of high quality educational tools for diverse learners" (Carnine, 1994, p. 345).

These principles are central to designing language and early reading instruction that responds to the acute instructional needs of children of poverty—those who are vulnerable and need intensive and systematic methods to achieve the complex rules and strategies required of reading and language. The framework and curricular implications are essential for children "for whom simply keeping pace with their peers' amounts to losing more and more ground" (Kame'enui, 1993, p. 379). NCITE associates (Dixon et al., 1992) identified the following six principles that traverse a range of academic contents and are sufficiently encompassing, sensitive, and flexible to capture the distinct and critical features of varying academic domains and cognitive constructs (e.g., phonological awareness, metacognition): *big ideas, mediated scaffolding, conspicuous strategies, strategic integration, primed background knowledge,* and

judicious review. In this chapter, we focus on their application to the content of preschool vocabulary, concept, and comprehension development.

For the preschool intervention profiled here, we also drew upon research in shared-book and dialogic reading intervention models designed to enhance children's oral language and listening comprehension abilities (Whitehurst & Longian, 1998). According to Chambers, Cheung, and Slavin (2006), early childhood curriculum models have been categorized along a continuum with direct instruction (Bereiter & Engelmann, 1966) as one anchor on the continuum and child-centered, developmental, maturational models as the opposite anchor. Our conceptual model sought to integrate the seemingly disparate approaches to developing children language and listening comprehension development through an (a) intentional design that specified the content and concepts to be taught with (b) explicit and plentiful opportunities for children to discuss, elaborate, and relate concepts and content. To address the latter goal of the intervention, we add a seventh principle: intentional opportunities for language interaction. A brief description follows each design principle. Illustrative examples from our preschool vocabulary and comprehension intervention will be described in a subsequent section of the chapter.

Principles of Instructional Design to Accelerate Vocabulary, Concept, and Comprehension Learning

Big ideas. Big ideas are concepts and principles that facilitate the most efficient and broadest acquisition of knowledge across a range of examples in a domain (Carnine, 1994). Big ideas make it possible for students to learn the most information as efficiently as possible and serve as anchoring concepts by which "small" ideas can often be understood. In instructional curricula, big ideas serve to emphasize what is important. The principal assumptions supporting big idea instruction is that not all curriculum objectives and related activities contribute equally

to academic development, and that more essential information should be taught more thoroughly than less important information (Brophy, 1992; Carnine, 1994). Specifically, some concepts are fundamental whereas others are simply *not* essential. For children of poverty who enter with less knowledge than their more advantaged peers, it is important that big ideas become prominent features of instruction.

Conspicuous strategies. Strategies refer to a general set of steps experts follow to solve problems. Many students induce the steps in a strategy on their own. However, inducing effective learning strategies may require a considerable amount of time. For children of poverty, such an approach is highly problematic because instructional time is a precious commodity and these learners may not easily induce an effective or efficient strategy. Learning is most efficient when strategies are made explicit.

Mediated scaffolding. Mediated scaffolding refers to the personal guidance, assistance, and support that teachers, peers, materials, or tasks provide a learner. Rosenshine (1995) classified versions of scaffolds as "procedural prompts" that range from key words that help children generate questions as they read "who, what, when" to frameworks for concept maps. Scaffolds can be seen as temporary supports to assist the learner during initial learning and have a history of empirical support for this purpose (Vygotsky, 1978).

On new or difficult tasks, scaffolding may be substantial and then systematically and gradually faded as learners acquire knowledge and skills. Scaffolding can be achieved through careful selection of examples that progress from less difficult to more challenging, the use of illustrations and concrete examples to teach concepts, or scaffolded progression of instructional tasks from simpler to more complex (from three-sequence to four-, and then five-sequence retells).

Strategic integration. Strategic integration involves carefully combining new information with what the learner already knows to produce a more generalizable, higher-order skills. Integrating new information with existing knowledge increases the likelihood that new information will be understood at a deeper level. The integration must be strategic so that new information does not become confused with what the learner already knows. Likewise, it must be parsimonious, emphasizing critical connections. In our lessons, we purposefully designed "lesson units" around themes such as nature and topics such as water, air, and light and systematically taught the "sameness" features of nature. Nature is all the things that are not made by man. We then added examples each week to build a body of integrated knowledge.

Judicious review. Successful learning also depends on a review process to reinforce the essential building blocks of information within a content domain. According to Dempster (1991), the pedagogical jingle of "practice makes perfect" is simply not a reliable standard to ensure successful learning. Simple repetition of information does not ensure efficient learning.

Kame'enui and Carnine (1998) identified four critical dimensions of judicious review: (a) sufficient to enable a student to perform the task without hesitation, (b) distributed over time, (c) cumulative with less complex information integrated into more complex tasks, and (d) varied to illustrate the wide application of a student's understanding of the information.

Primed background knowledge. Priming is a brief reminder or exercise requiring the learner to retrieve known information. Successful acquisition of new information depends largely on the knowledge the learner brings to a task, the accuracy of that information, and the degree to which the learner accesses and uses it. For students who enter with limited knowledge of language and literacy, priming background knowledge is critical to success.

However, students with diverse learning needs may not access information in memory efficiently and effectively or may not consistently rely on effective strategies to identify unknown words. In such cases, a teacher primes the critical background knowledge for understanding new vocabulary and related concepts within the context of a big idea (theme) that facilitates connecting new knowledge with what the student already knows. Vygotsky describes the importance of drawing parallels between book concepts and knowledge gained via one's cultural or familiar home connections because such experiences assist students in connecting the realm of the familiar to the unfamiliar and facilitate deep understanding of topics (Meacham, 2001). For example, it is much more effective to learn about how water freezes in a discussion on nature and the familiar uses of water (drinking, swimming) than to read a book about water freezing, without such a discussion. In short, by priming critical background knowledge , students are more able to talk deeply about and remember concepts and vocabulary related to a big idea.

Intentional opportunities for language interaction. This principle was added to the original six-principle framework to address intentionally designed opportunities for children to respond, discuss, and relate to high-priority content. In our intervention, we use a range of language opportunities in which students' responses vary according to the language task. In Carroll's model, student involvement with academic content during time allocated for instruction was central to maximizing learning opportunities. In essence, engagement rate was the percentage of time students were involved in the learning process. Dialogic reading practices (Whitehurst & Lonigan, 1998) involve opportunities for children to use language to identify, define, describe, discuss, relate, sequence, retell, and associate. Our intervention sought to

balance the need to (a) increase the rate at which information can be presented and practiced, and (b) actively engage students in tasks that are highly relevant to the content of instruction.

In the following, we introduce the specific project that incorporated these design principles to construct a preschool book reading intervention to accelerate low-income children's depth and breadth of vocabulary and concept knowledge and listening comprehension strategies.

Words of Oral Reading and Language Development Intervention (WORLD)

The purpose of the Project WORLD (Gonzalez, Simmons, & Pollard-Durodola, 2004) is to develop a preschool shared-book reading instructional intervention that accelerates word and world knowledge acquisition for children at-risk of academic underachievement. To construct this intervention, we first reviewed extant research on shared-book reading to understand an empirical foundation on which to build.

Research conducted over the last 15 years makes it increasingly clear that many of the skills fostered during shared-book reading facilitate the later development of language and literacy abilities (Ezell & Justice, 2005; De Temple & Snow, 2003; Wasik & Bond, 2001). We have learned that reading aloud to children can provide a powerful instructional context for facilitating and accelerating linguistic growth (Lonigan & Whitehurst, 1998; Teale, 2003). And we have seen that children with poor vocabulary skills can learn vocabulary from listening to readings of storybooks (Coyne, Simmons, Kame'enui & Stoolmiller, 2004; Dickinson & Smith, 1994; Hargrave & Senechal, 2005). We also know that storybook reading jointly with discussion and other activities can positively influence comprehension (Morrow & Brittain, 2003). We have observed that shared reading can have a significant impact upon the school readiness of children from low-income families (Zevenbergen, Whitehurst & Zevenbergen, 2003). Further, we have discovered that even simple interactions during shared reading are more beneficial than passive

listening for children (Reese, Cox, Harte & McAnally, 2003). Finally, we know that quality in the way adults read to children matters considerably to children's language learning (Justice, Meier & Walpole, 2005; Kaderavek & Justice, 2002).

Researchers have sought to analyze adult-child storybook reading to identify features that effectively support children's language and literacy development. In some instances, these aspects have featured prominently in intervention programs that subsequently have demonstrated effects on language and literacy development (Teale, 2003). Despite convergence in the findings, surprisingly little attention has been directed to the influence of other important conceptual and procedural issues related to how to read books (van Kleeck, 2003). In this section, we discuss characteristics of shared-book reading employed in the WORLD intervention that extend existing research.

The WORLD intervention seeks to increase preschool children's knowledge of vocabulary and concepts by integrating a set of instructional design principles with research-based strategies of book reading. The instructional design or building blocks for the WORLD intervention are based on the seven-principle framework previously outlined: *big ideas, mediated scaffolding, conspicuous strategies, strategic integration, primed background knowledge, judicious review,* and *intentional opportunities for language interaction.* Following we describe the application of extant research to the seven-principle framework using examples from the instructional curriculum to illustrate.

Big ideas. In early vocabulary and language development, the environmental and experiential conditions that co-exist in low-income homes often result in significant disparities in children's breadth and depth of knowledge. To close these gaps, we must identify the domains of knowledge, vocabulary, and comprehension strategies preschoolers need to possess and teach

them deeply. The content or big ideas for the WORLD intervention were built on three interdependent domains designed to strengthen children's (a) knowledge of world concepts, (b) word knowledge, and (c) text structure. Through the strategic integration of these domains, the intervention addresses multiple underlying causes of comprehension difficulties.

For our shared-book reading intervention, big idea vocabulary and world concepts were linked to recommended guidelines for what preschool children should be capable of with regard to use of vocabulary knowledge and application of listening comprehension strategies. Therefore, big ideas included both the content or vocabulary and concepts we wanted children to learn as well as outcomes for what children should be able to do.

Domain 1: World knowledge. To acquire the very basic foundations for later learning, children must develop a coherent understanding of knowledge and concepts (Neuman, 2006). Further, to comprehend new content, children need a threshold level of knowledge about the topic of discussion. When children experience difficulties in comprehending, it is often due to lack of knowledge of the subject matter and related concepts (Walsh, 2003). For many children, comprehension difficulties exist because their prior experiences did not provide the conceptual anchors on which to build new knowledge. Project WORLD creates world knowledge through focused themes that build background knowledge that is both appropriate for preschool and important for later learning.

Domain 2: Word knowledge. Children who enter school with less depth and breadth of vocabulary knowledge need multiple exposures to certain words that carry meaning and to many words, in general, to develop associative level knowledge (Baker, Simmons Kame'enui, 1998). Books serve as lexical reservoirs (De Temple & Snow, 2006). Notwithstanding, there has been

relatively little work in adult-child shared reading on the effects of building vocabulary with books having carefully selected or different lexical inventories.

Vocabulary must be fostered intensively in the earliest grades and largely built through broad exposure to content-rich knowledge (Hirsch, 2006) using different text genres. Words are learned incrementally and cumulatively after multiple exposures (Stahl, 1991). As a child encounters a word repeatedly, more and more information accumulates about that word until the child obtains a vague notion of what it means. Multiple encounters over time allow words to become permanently and flexibly a part of a child's repertoire. However, some words need to be explicitly taught and reviewed to develop fully and flexibly (Stahl, 1991). In WORLD, words were selected to develop lexical sets (e.g., water, liquid, frozen) to enable students to develop associative knowledge. Words were selected based on their importance and utility, instructional potential, and conceptual understanding by the child (Beck, McKeown, & Kucan, 2002).

Domain (3): Knowledge of text structure. Research suggests that providing children with informational texts early in their schooling may help mitigate the uneven distribution of out-of-school experiential learning opportunities among children from various backgrounds (Duke, 1999; Hirsch, 2006). Though multiple structures exist, reading comprehension researchers are keenly aware of the traditional over-reliance on narrative forms in the early grades. Reading stories, however, is insufficient to familiarize children with the numerous non-narrative forms (Smolkin & Donovan, 2000) of language. Evidence shows that sharing expository texts promotes more child interactions around concept building and vocabulary dialogue with adults (van Kleeck, 2003). In fact, informational book read-alouds can foster a context for engaging in direct instruction of comprehension (Smolkin & Donovan, 2000). Young children can learn content, as well as language, from informational as well as narrative text (Duke et al., 2003). Studies also

show that both teachers and parents attend more to vocabulary and comprehension when interacting with children around informational texts, thus reinforcing the notion that informational texts have vocabulary-building potential (Smolkin & Donovan, 2000). WORLD integrates informational texts into the book selection and teach critical features of stories and informational text.

In summary, instruction on "big ideas" allows concepts, vocabulary, and domains of knowledge to be studied deeply, over extended periods of time, and with multiple exposures. This may seem counterintuitive to the prevailing practice to expose children to a range of important topics and vocabulary. Yet, acceleration begins with the assumption that not all knowledge and content is equally important and that unless high-priority content is learned and mastered, acceleration cannot occur.

Building Blocks of Intervention

Figure 1 depicts the building blocks used to construct the WORLD intervention. We began with science content derived from examining the prekindergarten guidelines for the state of Texas and mapping that against the science content of the Core Knowledge Preschool guidelines (Core Knowledge Foundation, 2000). Two themes were identified, *nature* and *living things,* that served as conceptual foci for the intervention. By organizing instruction around nature and living things, we were able to provide students with multiple exposures to vocabulary and reoccurring concepts so that knowledge was integrated and studied deeply from text to text. Organizing big ideas by themes allows students to gain more depth in content knowledge and facilitates comprehension and retention of vocabulary knowledge (Barrera, 1992; De Leon & Medina, 1998; Guthrie & Wigfield, 2000).

From these two thematic units, lessons were organized into seven related topics (i.e., water, light, air, seasons, plans, animals, our body) to prime background knowledge in high-utility content and strategically integrate concepts with previously learned material. Each topic included narrative and informational texts. Multiple text genres were employed to teach critical features of stories and informational texts. Storybooks facilitated the study of story characters, the main idea ("the big thing that happened"), setting, and story problem and informational texts provided opportunities to learn more about the seven topics within the context of two overarching themes. Each week focused on a concept developed in a book. For instance, during the first theme on nature, under the topic of water, children were read two books, *Rain Talk* (**insert author**) and *Amazing Water* (**insert author**) and taught the concepts of how water moves and what water can do.

Regarding vocabulary**,** we strategically selected Tier II words (Beck, McKeown, & Kucan, 2003) with high utility and importance later learning, assuming they would enable preschool children to make associations between new vocabulary and familiar concepts and to generalize vocabulary across multiple contexts. (Tier II words are used to generate background knowledge and provide students access to academic language.) Three words were selected per text for a total of six words being explicitly taught each week. Explicit teaching refers to preteaching vocabulary word meanings and modeling correct syntactic use of words while discussing what was learned or making real-life connections. Because books were chosen based on the appropriateness of their themes, target words contributed to deep understanding of critical science topics. For example, in the storybook *Gilberto and the Wind* (Ets, 1963), the overarching theme is nature and the critical science topic is *what air can do*. Three words, wind (air that moves), float (when something stays up in the air or water), and scatter (to throw things all

around), are taught to assist students in learning more about the role of air within the natural world.

In addition to the strategic selection of target words, children receive multiple exposures to words before, while, and after reading the text. Prior to reading the text, the teacher primes background knowledge by talking about the theme and the topic and previewing the vocabulary with engaging picture concept cards that visually depict what air can do. For example, students talk about pictures that show (a) how wind can move pieces of paper, (b) how something can float by staying up in the air or water, and (c) how air can scatter or move things around. Further, while reading the book, the teacher stops to discuss the three target words when they first appear on the page and shows illustrations of wind, float, and scatter. After reading, target words are reviewed, employing the picture concept cards used before reading so that students can "be the teacher" and help the group recall what the words mean. Comprehension questions provide an additional exposure to the target words as children discuss how kites *float* in the air and how the wind and air *scattered* the leaves. Lastly, scientific and word knowledge is integrated with life experiences when children describe fun things they do outside when it is windy.

The final big idea in the WORLD intervention emphasizes what children will learn and be able to do regarding language and comprehension skills. *Vocabulary outcomes* focus on developing a steady increase in receptive and expressive vocabulary and using these terms in contextualized and decontextualized settings. *Comprehension outcomes* emphasizes learning information and facts from books, predicting events in a story, sequencing events, retelling three- to five-sequence stories, and answering literal and inferential questions.

Conspicuous Strategies

To accelerate learning, children must learn vocabulary both incidentally and intentionally. Vocabulary acquisition is not an either-or situation. However, because children of poverty often enter preschool with less knowledge than their more advantaged peers and have not acquired vocabulary through incidental exposure, vocabulary instruction of high-priority words must be conspicuous or explicit (Baker, Simmons & Kame'enui, 1998). Use of numerous instructional methods has led to increased student knowledge of individual words that could be expected from incidental learning opportunities. However, converging evidence of curriculum design in vocabulary acquisition demonstrates that vocabulary development for diverse learners must be explicit, unambiguous and consist of carefully designed and delivered teacher actions (Baker et al., 1998). In vocabulary instruction, this translates into direct presentation of word meanings with clear and sameness of wording across multiple contexts facilitated by teacher modeling (Coyne, Simmons, Kame'enui & Stoolmiller, 2004). Research in vocabulary instruction shows that by employing conspicuous strategies teachers can make better sense of where, why, and how strategy use results in success of failure (Baker, Simmons & Kame'enui, 1995).

Explicit strategies are used in initial sequences of instruction and then faded as learners become more independent and knowledgeable. In the initial two weeks of the intervention, conspicuous strategies are employed to prompt dialogic discussions of what happened in the storybook or to recall new information learned about a topic, After rereading *Rain Talk* on the second day of the first intervention week, for example, students are asked to sequence important story events by retelling what happened first, next, and last. An instructional scaffold consists of a teacher modeling how to identify what happened first, next, and last using pictures from the

story. The teacher might say, “Now I’ll find the picture of what happened first.” After selecting the appropriate event, she would continue,

”It’s my turn to tell what happened first: First the girl saw raindrops falling from the sky.

Now it’s _____ ‘s turn to tell us what happened first. Start by saying “first.”

Last, the teacher would retell the entire story and prompt a group retelling of events by a verbal prompting of *first, next,* and *last.* The teacher modeling is faded in later lessons when children are able to retell a three- and five-part story sequence on their own.

For vocabulary, conspicuous instruction is used in a range of activities that teach initial definitions and examples within the book to outside-the-book comparisons of vocabulary. The following lesson excerpt demonstrates an instructional strategy that teaches children to identify the sameness in two illustrations.

Conspicuous strategies for teaching two-picture comparisons

Look at this picture. (point) What does this picture show? Everyone…

🗣 (children respond) raindrop.

It’s my turn to be the teacher and tell us about a raindrop. A raindrop is a tiny bit of water that falls from the sky. Now it’s _____’s (student name) turn to be the teacher and tell us what a raindrop is.

🗣 student responses will vary.

Yes, a raindrop is a tiny bit of water that falls from the sky. Now, look at my new picture of raindrop. (point). These pictures both show raindrops. (point) Now I’ll tell you what is the same about the raindrops. They are both drops of water, and they both make things wet. Now you tell me what is the same about the raindrops in these pictures. They are both drops of water, what else? They both …

🗣 come from rain
🗣 make things wet, etc.

Yes, they are both rain and make things wet.

Strategic Integration

Strategic integration within vocabulary instruction refers to the thoughtful planning, consideration, and sequencing of vocabulary activities to promote and accelerate vocabulary development (Baker et al., 1998). We know that making target vocabulary salient and meaningful helps children benefit from instruction (Justice, 2002; Wasik & Bond, 2001). Critical research findings show that word learning is maximized when words are taught in meaningful contexts (Hirsch, 2006). In fact, the most critical factor in learning from context is the degree to which children can integrate information presented in texts with prior knowledge (Senechal, Thomas, & Monker, 1995). To integrate new words into their lexicons, children need multiple exposures and opportunities with words. New information that is thoughtfully and strategically integrated with previously acquired knowledge across multiple contexts has the highest probability of being retained over time (Baker et al., 1998).

Within the WORLD intervention, strategic integration of new information with what the learner already knows is primarily accomplished through weekly organization of "twin texts" —one storybook and one informational text—which are associated by theme and topic. When learning that nature is "all the things that are not made by people," children learn that water, air, and sunlight play crucial roles in the natural world. Weekly texts address and develop one of these topics (water, air, etc.) deeply so that children integrate vocabulary and world concepts learned from the storybook with concepts presented in the informational text. In this process, vocabulary is integrated within the *broader context* of structured thematic knowledge and children are cumulatively exposed to *relationships* between thematic vocabulary and concepts. Children understand new information by *relating* it to what they already know as narrative and

informational text and vocabulary words within and between books are connected by a big idea theme and smaller topic. For example, within the thematic unit of nature, children learn concepts about light as they listen to the storybook *Moonbear's Shadow* (Asch, 1985), which facilitates a discussion of the target words *shadow*, *noon*, and *sky*. Within the same week, these concepts are further developed and integrated with knowledge about target words *light, bright*, and *dark*, which are introduced in the informational text *Light*. On the last day of the lesson on light, a cumulative review of word and world concepts takes place, culminating in instruction that encourages the children to make associations and connections between concepts learned during the entire week. These vocabulary and world concepts are then integrated within subsequent lessons in meaningful ways. Table 1 illustrates an example of the thematic arrangement of books and words to facilitate conceptual integration.

Table 1

Sample Thematic Arrangement of Books and Words to Facilitate Conceptual Integration

Weekly Topic	Book & Concept	Vocabulary	Word Meanings
Week 1: **Water**	***Rain Talk by Mary Serfozo*** How rain moves	1. Raindrop 2. Drain	*A tiny bit of water that falls from the sky.* *Something that moves water out.*
	Amazing Water by Melvin Berger What water can do	1. Liquid 2. Frozen	*Something wet like water or juice.* *Something that gets cold and hard.*
Week 2: **Water**	***A Snowy Day by Ezra Jack Keats*** What happens when water freezes	1. Snow 2. Melt	*Frozen water that falls from the sky.* *When something gets warm and turns into liquid.*
	Snow What happens when water freezes	1. Cloud 2. Snowflake	*The white thing in the sky that rain and snow come from.* *One little piece of snow.*

Judicious Review

So how does a teacher select information for review, schedule review to ensure retention, and design activities to extend the learner's understanding of the skills, concepts, or strategies? Within our lessons, students experience multiple exposures to individual vocabulary (e.g., liquid, plants, seasons) in a variety of tasks. We also promote information retention by providing weekly practice on all vocabulary taught within a theme. Therefore, by the end of six weeks of instruction, students will have learned 32 words related to nature, organized in lexical sets of related words.

Vocabulary learning formats that occur in the context of storybook reading constitute a platform that is especially suited for "review" of previously learned vocabulary. Research documents that effective vocabulary instruction employs thoughtfully scheduled review and

practice with multiple opportunities to use new words to help children strengthen associations and relations of newly acquired knowledge with the developing lexicons (Coyne et al., 2004). Judicious review places a high premium on the value of review and application of previously learned information that is carefully distributed, cumulative, and varied. Evidence shows that after repeated review and careful exposure to books, children's questions are centered less on the book's pictures and begin to reflect questions about the word meanings (Kaderavek & Justice, 2005).

Judicious review provides two instructionally relevant benefits: (a) it ensures that children continue with their understanding of targeted words at the intended meaning levels, and (b) it promotes the learning of words at deeper levels of processing and understanding (Baker et al., 1998)

The four critical dimensions of judicious review are accomplished in our shared-book reading intervention through repeated readings of storybooks and informational texts and cumulative activities that retain new words in the lessons as children learn vocabulary and world knowledge connected by topic and theme. The scope and sequence of our intervention consists of five-day lessons in which new information is introduced on Days One and Three and new information is reviewed on Days Two and Four. For example, when children are learning about the topic "our body" within the theme of living things, the teacher constructs a discussion on different ways we can help our bodies when we are sick. Three related target words are taught within the context of the story while reading the storybook *Author's Chicken Pox* on the first day. On the second day of instruction, the storybook is read again without stopping, followed by activities that require children to review (a) the book within the context of the theme and topic and (b) apply concept knowledge using the target words. The same process occurs when reading

the related informational text, *Eating Right* which reinforces knowledge about keeping our bodies healthy. Repeated reading of the text on the second day of instruction helps children to remember vocabulary knowledge and concepts (Biemiller & Boote, 2006; Kaderavek & Justice, 2005). The provision of extended opportunities and exposures to critical concepts and vocabulary strengthens associations and retention of previously learned material.

Day Five of the intervention lesson serves as a cumulative review of both word and world concepts with opportunities for students to apply and integrate knowledge learned from the present week and from previous lessons. Activities progress from simple tasks to those requiring more complex knowledge and higher-order thinking. In this judicious review, simpler tasks require students to label pictures of vocabulary words learned across several weeks, in addition to retelling a story sequentially or recalling knowledge learned from an informational text as it relates to the topic and theme. More complex tasks require students to use their knowledge to discuss the big thing (main idea) that happened in a story and to make associations between target words and concepts outside the familiar context of the storybook and informational text. In the activity "Things That Go Together," for example, the teacher uses different picture concept cards to compare critical attributes of vocabulary and concepts. Students see a new picture of melting ice cubes and label the picture as "melt." They are then presented with a different picture with similar attributes, which they label as "frozen." Students subsequently finish the following sentence: Melt (point to the ice cubes) and frozen (point to the frozen vines) are both things that happen to _____ (water). This type of activity requires students to apply information they have learned about water while constructing meaningful associations between the vocabulary words *melt* and *frozen*.

Mediated Scaffolding

Mediated scaffolding refers to external supports that provide students with sufficient help during initial learning to foster independence but no so much assistance that they become over-reliant on them (Baker et al., 1998). Supports may come in the amount of teacher guidance provided, the language supports available, or the complexity of the task. The supports are systematically faded as teacher instruction is minimized, tasks are generalized to a range of new examples, and task difficulty increases.

An example of mediated scaffolding in our intervention extends Dickinson's descriptive research in shared-book reading documenting the importance of dialogic reading and discussion (Dickinson & Smith, 1994). Our scaffolds progress from low-cognitive (e.g. labeling, identifying) tasks to those requiring high-cognitive abilities (e.g., associating, relating). Early in our lessons students are asked to merely identify or label specific vocabulary or concepts. Next, they define and describe target words and progress to activities that require them to associate and relate words to one another and to personal experiences. A second type of vocabulary scaffold within our intervention relies on brief elaborations of vocabulary words while reading the book (Hargrave & Senechal, 2000; Justice, 2002, 2005; Wasik & Bond, 2001, Wasik, Bond, & Hindman, 2006). In our interventions, teachers also scaffold vocabulary learning by providing brief, point-of-use elaborations in child-friendly definitions (Beck, McKeown, & Kucan, 2003).

Primed Background Knowledge

Verbal display of background knowledge is rarely addressed in the book-sharing research (van Kleeck, 2003). This is a glaring omission as priming or activating background knowledge greatly helps students draw on their personal experiences as a way to make sense of newly encountered information (Baker et al., 1998). Children need to acquire the language and background knowledge required of their lessons and texts. Teachers can play a prominent role in

helping students acquire the background knowledge necessary to incorporate critical information and skills. Without these building blocks, children have great difficulty in developing into strong comprehenders (Hirsch, 2006). Too often, research shows a concern with ensuring that lessons and texts "not" exceed the language and knowledge children already possess (Neuman, 2006). However, having children discuss what happens when water freezes prior to learning new words like *snow* (frozen water that falls from the sky), *snowflake* (one little piece of frozen water that falls from the sky), and *melt* (when something gets warm and turns into a liquid) accelerates their ability to see knowledge as structured relationships and better relate new information to what is already known (Nagy, 1988). Background building and activating activities occur each day of the intervention in an activity labeled: "Talk About Theme and Topic." The following example illustrates how the kinds of water and attributes of nature are integrated to strengthen conceptual networks.

Talk About the Theme and Topic

Yesterday, we read an information book about water.
What are some different kinds of water we learned?
🗣 snow, cloud, water to play in, ice

Yes, these are all types of water.

Remember, water is something in nature. Nature is all the things that are not made by people like water, air, and sunlight. What are some things in nature? Everyone …
🗣 water, air, and sunlight

Intentional Opportunities for Language Interaction

The WORLD intervention was designed to maximize opportunities for student engagement via scripted lessons, small-group instruction, group and individual turns, and intentionally specified opportunities to discuss and respond.

Scripted lessons. Scripted approaches or specified curricular programs have been successfully utilized in school reforms (Borman, Hewes, Overman, & Brown, 2003; Mac Iver & Kemper, 2002). They rely on lessons that are highly specified for the teacher with expected student responses. Encouraging brisk pacing, the lessons include techniques for introducing new skills, correcting student errors, and monitoring of student behaviors (Carlson & Francis, 2002; Carnine, Silbert, & Kame'enui, 1997). In the WORLD book reading intervention, scripted lessons were provided to preschool teachers to ensure consistency in the teaching of vocabulary and conceptual knowledge, to assist in managing instructional time, and to provide scheduled opportunities for student engagement and dialogic discussions. The lessons were designed to ensure that all preschool interventionists, from varied educational and professional backgrounds, were able to manage instructional time utilized before, during, and after reading books and provide opportunities for extending oral responses. However, teaching from a scripted lesson does not result in a robot-like delivery of instruction in which teachers simply "read the script" (Grossen, 2002). Effective teachers using scripted approaches constantly respond to the nuances in students' performance by providing mediated scaffolding and ongoing monitoring of student responses. In summary, our scripted lessons provide instructional clarity of critical content so that students are able to learn through explicit, scaffolded instruction.

Small-group format. The preschool teachers in our study taught small groups of six or seven students, a format that facilitated high student engagement and allowed teachers to provide feedback at both the individual and the group level. Although the typical practice of storybook reading occurs while reading to the entire class, some evidence suggests that small-group instruction may provide greater instructional intensity (Vaughn & Linan-Thompson, 2003; Vaughn, Linan-Thompson, & Hickman, 2003) and facilitate the dialogic nature of teacher-

student interactions. For children living in poverty, small-group instruction may be more critical in the acceleration of vocabulary development and comprehension abilities as it affords opportunities to respond, discuss, and use language.

Group and individual turns. Opportunities for group and individual turns allow preschool teachers to informally assess student mastery of vocabulary knowledge, text structures, and comprehension of book content, as well as facilitated opportunities to engage in dialogic discussions. In the WORLD intervention, opportunities for group responses are scheduled before, during, and after reading the book. For example, prior to reading any book, all students in the group must demonstrate the ability to connect the theme and topic to life experiences and to develop appropriate concept knowledge necessary for comprehending book content. Group responses are also used while reading text to ensure that all students can label vocabulary concepts depicted in text illustrations. Individual turns are strategically scheduled after reading the book to provide an opportunity to "be the teacher" within the context of reviewing vocabulary concepts. During individual turns preschool teachers extend oral language responses so that students receive individual feedback or modeling of appropriate syntax and word usage.

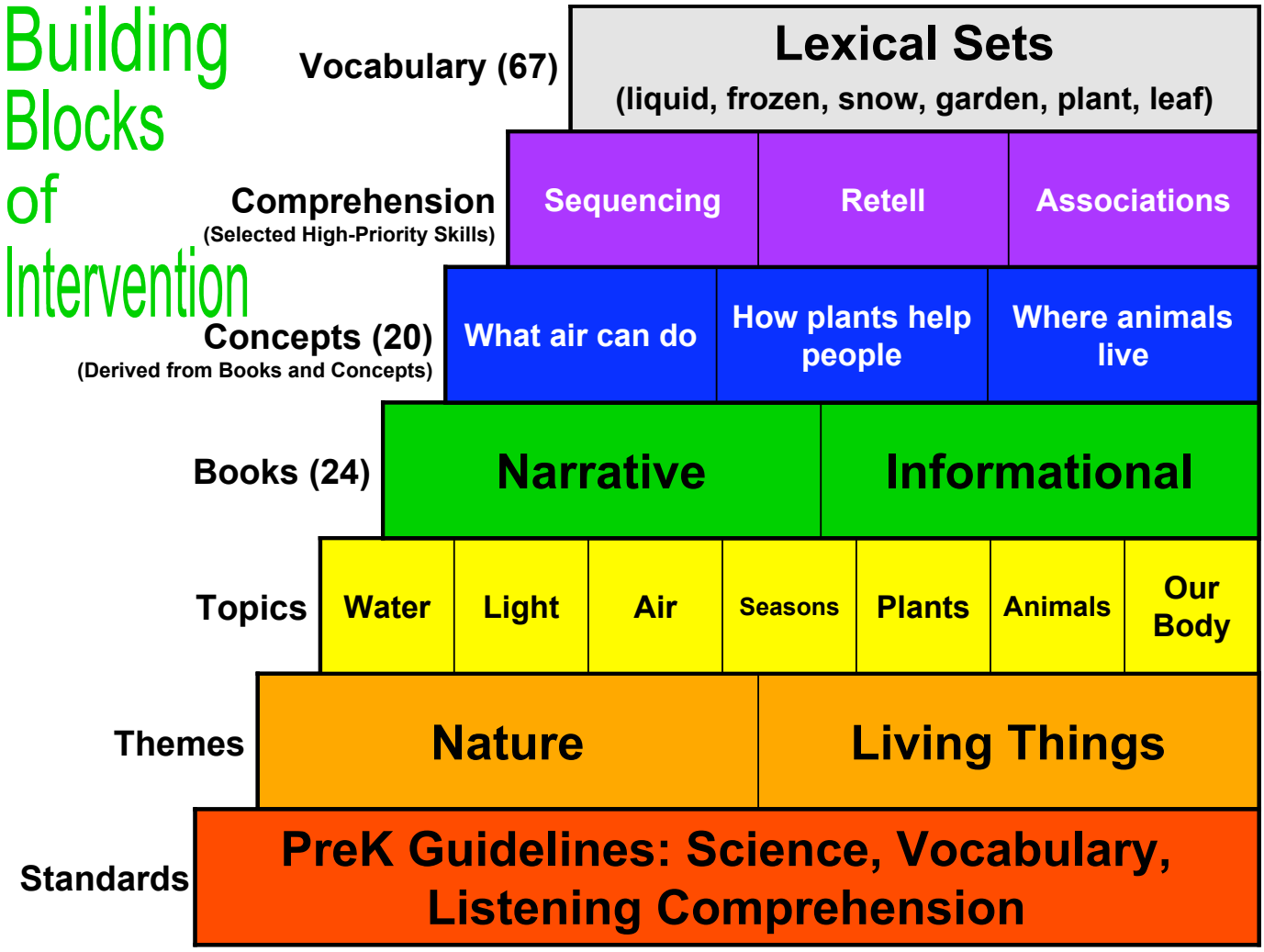
d. Intentionally designed opportunities to discuss/respond. Because our shared-book reading intervention was piloted with preschool teacher researchers, we were able to observe whether the instructional activities were conducive to discussing and student responding. Over time, some activities were modified or new ones created to increase the amount of instructional time spent in dialogic discussions. Specifically, a range of opportunities were strategically scheduled within the scripted lessons to facilitate talk about words, critical story grammar elements (character, main idea, setting), book content within the context of a theme and topic, and to assist students in applying new concepts in a lively discussion about life. The progression

of these activities ranged from simple to more complex ones. For example, talking about how animals, plants, and human bodies need water, air, and sunlight to live was less cognitively demanding than discussing the critical attributes of pictures that show what air can or cannot do. Opportunities to discuss/respond were usually followed by suggestions in the lesson for teacher scaffolding of oral student responses.

Summary

In this chapter, we maintained that language development is an economic matter. Specifically, it is a matter of investment, resource management, and quality instruction. For many children in low-income households the stresses and realities of poverty result in meager experiential investments and yields less knowledge of concepts and vocabulary that enable later learning. Children who enter school with "less" as defined within this context require skillfully engineered instruction that accelerates learning and maximizes the resource of time. To maximize time and positively alter learning trajectories, we build interventions based on principles that teach high-priority concepts, integrate knowledge, and engage students in relevant opportunities to discuss, describe, and associate new knowledge with familiar concepts. We contend that acceleration requires the most careful selection, arrangement, and management of information to maximize learning rates. We are in the midst of evaluating the effects of a book-based intervention designed to optimize preschool children's world and word knowledge through the application of instructional design principles outlined in this chapter. Through these efforts, we seek to build and bolster the conceptual knowledge base that will serve them in subsequent grades and content areas.

Figure 1. Building blocks of intervention.



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