



Ten Key Questions and Findings

About this document:

As it sought to develop a business plan for early childhood care and education in Minnesota, the funders group started with some key questions about early childhood development and learning. This document summarizes some of the primary scientific, academic and public policy literature related to these questions. Because early childhood development and learning spans multiple fields, from neuroscience, to psychology, health, program evaluation and education, this document does not purport to be an exhaustive review. Rather, it makes use of existing literature reviews from various fields. Furthermore, as some of the findings run counter to popular beliefs, this document makes extensive use of quotes to avoid misinterpretations.

Question One: What environments, opportunities and activities are important for a young child's development to enable him to learn to his full potential?

“An early, growth-promoting environment, with adequate nutrients, free of toxins, and filled with social interactions with an attentive caregiver, prepares the architecture of the developing brain...” (NSCDC 2007, 1). For most children, typical early experiences lead to healthy brain development. Children who are exposed to toxic stress and/or who have developmental delays need interventions that expose them to necessary early experiences that build foundational skills.

More information, evidence and sources

William Greenough, Swanlund Professor of Psychology, Psychiatry, and Cell and Developmental Biology at University of Illinois-Urbana-Champaign, has found, “For the vast majority of kids in normal homes, all they will need in order to develop strong brain architecture is the kind of rich experience they will get from everyday interactions” (NSCDC 2006, 3).

According to the National Scientific Council on the Developing Child, the architecture of the brain depends on the mutual influences of genetics, environment, and experience. A varied array of “everyday” experiences that maintain the individual child’s attention are essential, but will only positively impact learning if the child’s brain circuitry is sufficiently “wired” to learn from the experiences. “When adults or communities expect young children to master skills for which the necessary brain circuits have not yet formed, they waste time and resources and may even impair healthy brain development by inducing excessive stress on the child...Didactic instruction in skill areas that are developmentally inappropriate for young children is an exercise in futility” (NSCDC 2007, 4-5). Cognitive, social, and emotional capacities are at very early stages of maturation at age three.

Children exposed to toxic stress and/or who have developmental delays and disabilities need interventions that ex

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pose them to necessary early experiences that build the foundational skills they need to realize their full potential.

What causes toxic stress? “Strong and persistent activation of the body’s stress response systems (i.e., increases in heart rate, blood pressure, and stress hormones such as cortisol and cytokines) can result in the permanent disruption of brain circuits during the sensitive periods in which they are maturing. Common causes of such ‘toxic’ stress include child abuse, serious neglect, and prolonged or repeated exposure to violence, which may be associated with deep poverty, parental substance abuse, or maternal mental illness, such as severe depression” (NSCDC 2007, 9). In *From Neurons to Neighborhoods* (2000) the National Research Council and Institute of Medicine also listed poor nutrition, specific infections, environmental toxins, and drug exposure, beginning early in the prenatal period, as threats to the developing nervous system (National Research Council and Institute of Medicine 2000, 7).

Another ‘toxic’ stress associated with deficits in brain development is posttraumatic stress disorder (PTSD), a condition that can develop after a child has experienced or witnessed a traumatic or terrifying event in which serious physical harm occurred or was threatened. According to WebMD, PTSD “is a lasting consequence of traumatic ordeals that cause intense fear, helplessness, or horror, such as a sexual or physical assault, the unexpected death of a loved one, an accident, war [including “observing assault or murder that occur while living in high crime areas” (Kaplan 2002)], or natural disaster [such as a hurricane]” (WebMD, accessed 2009). Sheldon J. Kaplan, PhD also includes in his identification of causes among children, “witnessing domestic violence...and...watching traumatic events on television” (Kaplan 2002). Kaplan summarizes research about the specific impacts on children’s brain development in his article, “Post-Traumatic Stress Disorder in Children and Adolescents: A Clinical Overview” in *Jacksonville Medicine*.

The National Institute on Media and the Family warns of the potential cumulative effects of media violence (on television, movies, internet, and video games) on children’s behavioral development. “Six prominent medical groups (American Academy of Pediatrics, American Academy of Child & Adolescent Psychiatry, American Psychological Association, American Medical Association, American Academy of Family Physicians and the American Psychiatric Association) warn of these effects of media violence on children:

Children will increase anti-social and aggressive behavior.

Children may become less sensitive to violence and those who suffer from violence.

Children may view the world as violent and mean, becoming more fearful of being a victim of violence.

Children will desire to see more violence in entertainment and real life.

Children will view violence as an acceptable way to settle conflicts
(Congressional Public Health Summit, 2000).”

Question Two: Are there critical periods for learning in the early years?

For children without developmental deficits, the opportunity to learn most cognitive, social, and emotional functions (i.e., those learned in school) remains open well beyond age three (NSCDC 2007). “From a neurobiological perspective, school readiness falls along a continuum throughout school segments rather than at any single point in time when children might be viewed as ‘coming ready to learn’” (Peterson 1994).

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More information, evidence and sources

“Basic aspects of brain function, such as our ability to see and hear effectively, do depend critically on very early experiences. Some aspects of emotional development also conform to this concept. Nevertheless, vast regions of the brain that are responsible for higher order functions—including most cognitive, social, and emotional capacities—have not yet begun to mature by age three or are at extremely early stages of maturation. Thus, although the basic principle of early plasticity generally applies (i.e. “earlier is better than later”), the important time periods for experience depend on the specific function of interest. For most functions, the window of opportunity remains open well beyond age three” (NSCDC 2007, 5).

Sean Brotherson, Assistant Professor and Family Science Specialist at North Dakota State University, expanded on this notion in 2005:

Learning continues throughout life. However, ‘prime times’ or ‘windows of opportunity’ exist when the brain is a kind of ‘supersponge,’ absorbing new information more easily than at other times and developing in major leaps. While this is true especially in the first three years of life, it continues throughout early childhood and adolescence. For example, young children learn the grammar and meaning of their native language with only simple exposure.

While learning later is possible, it usually is slower and more difficult. Some improvement in most skills is possible throughout life. However, providing children with the best opportunity for learning and growth during the periods when their minds are most ready to absorb new information is important.

Visual and auditory development

The ‘prime time’ for visual and auditory development, or a child’s capacity for learning to see and hear, is from birth to between 4 and 5 years old. The development of these sensory capacities is very important for allowing children, especially babies, to perceive and interact with the world around them. During the first few months, especially, babies need to see shapes, colors, objects at varying distances and movement for the brain to learn how to see. Babies also need exposure to a variety of sounds so their brain can learn to process that information and allow for responsiveness by hearing something.

Language development

The ‘prime time’ for language development and learning to talk is from birth to 10 years of age. Children are learning language during this entire period. However, the ‘prime time’ for language learning is the first few years of life. Children need to hear you constantly talk, sing and read to them during these early years. Respond to their babbling and language efforts.

Children vary in their language development during these first years, so parents should allow for some variation in children’s abilities at different ages. They should encourage language development, be patient and seek assistance from a qualified professional if concerns arise about a child’s progress in this area.

Physical and motor development

The ‘prime time’ for physical and motor development in children is from birth to 12 years of age. Children be

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come physically ready for different aspects of motor development at different times. Large motor skills, such as walking, tend to come before the refinement of fine motor skills, such as using a crayon.

A child needs several years to develop the coordination skills to play catch with a ball easily, and even then refinement of such skills continues into a child's early adolescence. Parents should monitor a child's motor development but be patient since children vary in their rates of development.

Emotional and social development

The 'prime time' for emotional and social development in children is birth to 12 years of age. Differing aspects of emotional and social development, which incorporate higher capacities, such as awareness of others, empathy and trust, are important at different times. For example, the real 'prime time' for emotional attachment to be developed is from birth to 18 months, when a young child is forming attachments with critical caregivers. Such development provides the foundations for other aspects of emotional development that occur as children grow.

Emotional intelligence is critical to life success. The part of the brain that regulates emotion, the amygdala, is shaped early on by experience and forms the brain's emotional wiring. Early nurturing is important to learning empathy, happiness, hopefulness and resiliency.

Social development, which involves both self-awareness and a child's ability to interact with others, also occurs in stages. For example, sharing toys is something that a 2-year old's brain is not fully developed to do well, so this social ability is more common and positive with toddlers who are 3 or older. A parent's efforts to nurture and guide a child will assist in laying healthy foundations for social and emotional development (Brotherson 2005).

Brotherson's work suggests that brain development, and thus school readiness, is a process, not an event. Children are born ready to learn and will learn well whatever is next on their developmental continuum. In her review of school readiness from a neuro-cognitive perspective, Rita Peterson wrote:

Each new segment of school places new neuro-cognitive demands on the child—challenges for which the child or adolescent may or may not be ready, in a neurodevelopmental sense. Decades of studies have shown that children and adolescents are not very successful when the curriculum or instructional demands are not matched to their cognitive development. From a neurobiological perspective, readiness falls along a continuum throughout school segments rather than at any single point in time when children might be viewed as 'coming ready to learn' (Peterson 1994)

Additional research supports this notion. Oral language skills in one's home language, for example, are a foundation for other cognitive skills as reported by Linda M. Espinosa in 2008:

This review of research from a variety of disciplines about dual language development and the impact of different educational approaches for children ages three to eight runs counter to much conventional thinking... Children who were taught in English-only classrooms or transitioned to English instruction before they demonstrated well-established oral language abilities in their own language frequently never achieved high levels of English fluency...All children can benefit cognitively, linguistically and culturally, from learning more than one language... The most recent evidence suggests that intensive support for the home language during the preschool years will help, not hurt, long-term attainment in English (Espinosa 2008, 2-4). [underline added for emphasis]

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According to John T. Bruer as well as the National Research Council and Institute of Medicine, most children will get the early experiences they need as they move through their developmental continuum while living in their typical environments, but some will not. Without appropriate interventions, some children who have visual impairments, auditory processing problems, major perceptual-motor delays, and other basic deficits cannot obtain experiences on which the developing brain depends. 'Toxic stress' conditions (discussed in [Question 1](#)) also manifest risks for healthy brain development. Beyond these extremes, the nature and boundaries of the environmental conditions necessary for healthy brain growth are less well known, partly owing to the complexity and the cumulative achievements of cognitive, language, and socio-emotional growth. Exploration in this area is cutting-edge research.

Question Three: What roles do family and culture play in a young child's learning?

Research is not definitive about the influence of family and culture groups on academic skills. Some assert that children who are members of varying culture groups may have skills that are not recognized well by the culture group that operates conventional schools and determines how to use assessment tools, but which are “useful from the perspective of children (and their families) who are culturally or linguistically diverse” (New 1999).

More information, evidence and sources

Much of the recent research on school readiness embraces the three components asserted by the NEGP in 1990: (1) readiness in the child; (2) schools' readiness for children; and (3) family and community supports and services that contribute to children's readiness (NEGP 1990). In 2004, the Southwest Educational Development Laboratory (SEDL, via its National Center for Family and Community Connections with Schools) noted, “Among advocates and policy researchers, readiness is discussed more and more as an interactive process or set of relationships in which the child, her or his family, the community environment, and the school interact in ways that support, or fail to support the child's physical, cognitive, and social-emotional development. However, in practice, as LaParo and Pianta (2000) and others have pointed out, ‘readiness is nearly always defined in terms of children's skills or characteristics’” (Boethel et al. 2004, 13).

The SEDL rigorously reviewed literature on family roles and influences on school readiness, and concluded “Not all families are able to accomplish all of these supportive roles; the particular family members who carry out different roles also tend to vary across cultural and socio-economic groups and individual family circumstances. Moreover, although we recognize the significance of these roles, the research base is less than definitive regarding both the ways in which specific family supports influence children's early academic skills and outcomes *and* the specific strategies that can help strengthen these supports” (Boethel et al. 2004, 16).

In 2000, Anne Masten published the results of a 20-year, Minnesota-specific longitudinal study, concluding that a child's resilience to adversity is best fostered by “a strong bond to a competent and caring adult; however, this adult need not be a parent. For children who do not have such an adult involved in their lives, this is the first order of business” (Maston 2000, 16-17). Masten also describes the importance of “human protective systems” in families and relationships and communities. The SEDL separately found that there are important roles embedded in systems, but points out that literature such as Masten's is rare. “The conceptual literature on readiness suggests important roles for the larger community, roles that are embedded in both institutions (e.g. churches and community centers) and in interpersonal relationships (e.g. neighbors and extended families). Beyond studies of community-based child care and

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preschool programs, however, community roles in supporting children's development are not well represented in the current research literature. A research base on neighborhood and community influences on child development suggests that a child's extended environment can mitigate family influences, both positively and negatively" (Boethel et al. 2004).

In a report published by Ready 4 K, Betty Emarita reported that children from varying cultures may have math, literacy, and other skills as well as means-of-learning that are not recognized well by conventional schools and assessment tools. Emarita's conclusions are based on analysis of best practices conducted by working groups of five "cultural communities" including African American, Hmong, Latino-Mexican-Chicano, the Mille Lacs Band of Ojibwe, and Somali. Emarita also conducted interviews and focus group research. She found:

Many children who enter kindergarten from families of color may be far more advanced than teachers are prepared to accept. However, the skills and abilities of these children may not be captured by worksheets or by a predominantly industrial model for learning which places high value upon working independently, conformity, and limited interpersonal interactions. These children may be more accustomed to demonstrating math and literacy skills in solving complex problems that relate to their life experiences... In addition, many children of color are accustomed to learning in groups, through vibrant interactions, and through touch—especially by caring adults who clearly indicate their authority. Too often they—particularly African American boys—are penalized for the very behaviors that are valued in their homes and communities (Emarita 2006, 7).

Examples discussed in the report "illustrate a plethora of abilities that are not yet captured by most instruments designed to measure the capacities of young children, but which many cultural communities value highly. These capacities incorporate a range of highly sophisticated, multi-layered skills, such as assessing situations, problem solving, and intervening to make a difference both with peers and in intergenerational interactions" (Emarita 2006, 9).

Emarita concludes that children may indeed be ready-to-learn, but kindergartens aren't ready to put children's varying skills to work in schools. In *The School Achievement of Minority Children*, Ulrich Neisser asserted a similar notion long championed by Ronald Edmunds of the "effective schools" movement: "...All children are educable. The fact that many poor and minority children fail to master the school curriculum does not reflect deficiencies in the children but rather inadequacies in the schools themselves." Neisser goes on to quote Edmunds' research-based assertion that achievement of basic school skills is relatively independent of family background, and that schools embracing some very specific principles can eliminate variation in achievement. Those principles are: strong instructional leadership and a clear sense of mission, demonstrate effective instructional behaviors, high expectations for all students, frequently monitor student achievement, and operate in a safe and orderly manner.

Rebecca S. New's findings from her review of early learning in sciences and math also describe how schools might be better prepared for culturally and linguistically diverse learners:

Children's knowledge of math, science, and technology—like any aspect of children's learning—is informed, influenced, and judged by the socio-cultural contexts and social exchanges that characterize their lives. Even very young children learn what is important, tolerated, and expected as they observe and participate in early educational experiences. Thus, gender-role stereotypes, ethnic identity, and

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self-image as a learner are among those understandings that develop during the period of early childhood...

Current thinking emphasizes the importance of connecting curriculum content with the larger context in which children live...The challenge in prompting competence in the skills and knowledge deemed critical by the larger culture is to consider the usefulness of such knowledge from the perspective of children (and their families) who are culturally or linguistically diverse. Children whose family lives are outside the mainstream ought to be encouraged to explore and express their own specialized knowledge (New 1999).

Question Four: What is the impact of poverty on early learning?

The relationship between poverty and learning is complex and multifaceted, as “many factors vary systemically with socioeconomic status” (Noble, Farah, and McCandliss 2006). Negative effects of poverty have been found by age five on cognitive skills and emotional and behavioral health. Neighborhood poverty is associated with less favorable long-term academic attainment. In the same vein, wage supplements, earnings disregards and basic human protective systems have been associated with positive effects on children’s cognitive and school outcomes.

More information, evidence and sources

In 2000, a review of literature by Child Trends found that family economic risk is inversely related to a child’s readiness for kindergarten:

While there is wide variability, on average, poor children score lower on standardized tests for verbal ability in early development (Brooks-Gunn, Britto, & Brady 1999). Negative effects of poverty have also been found by age five on cognitive skills, including reading readiness, number skills, problem solving, creativity, and memory (Stipek & Ryan, 1997)... Neighborhood poverty is associated with less favorable child and youth outcomes, including school readiness and long-term academic attainment (Brooks-Gunn, Duncan, & Aber, 1997; Ensminger, Lamkin, & Jacobson, 1996; Garner & Raudenbush, 1991; Klebanov et al., 1998). For example, children in high poverty areas are at a greater risk for low birthweight, infant mortality, child abuse, behavior problems, teen pregnancy and school dropout (Gephart, 1997). In contrast, residing in a neighborhood with less than 10 percent poverty appears to predict more favorable scores on tests of cognitive abilities, above and beyond the influence of family characteristics (Brooks-Gunn, Guo, & Furstenberg, 1993) (Zaslow, Calkins, and Halle 2000, xiii).

A 2006 study by Noble et. al. concluded, “Socioeconomic status [SES] is strongly associated with many measures of childhood cognitive and academic achievement, including IQ... SES has been found to have particularly large effects within the relatively specific domain of language development.” The authors note, however, that, “many other factors vary systemically with SES” (Noble, Farah, and McCandliss 2006). In other words, it is very difficult for research to distinguish whether poverty itself suppresses academic achievement or whether there are other mediating factors, such as the home literacy environment or other factors such as unstable housing, poor access to transportation, and unsafe neighborhoods.

The Center on the Developing Child at Harvard University expanded on these factors in 2007:

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Extensive research shows that children who grow up under conditions of poverty are more likely (relative to nonpoor children) to be less successful in school, less productive as adults in the labor market, have lifelong health problems, and commit crimes and engage in other forms of problematic behavior [Holzer, Duncan, and Ludwig 2007].

There are many reasons why low family income may be detrimental for young children. Early development can be compromised when parents cannot afford to provide nutritious meals, are unable to assure access to age-appropriate learning experiences both in the home and in early care and education settings outside the home, and cannot guarantee safe and growth-promoting neighborhood environments [Becker 1981]. Poverty and economic insecurity also can take a toll on parents' mental health, with depression and other forms of psychological distress profoundly affecting their interactions with their children [Zahn-Waxler, Duggal, and Gruber 2002].

Despite the strong and consistent correlations between poverty and diminished child well-being, relatively few studies have focused on isolating the adverse child impacts of low income itself in contrast to the effects of a host of associated conditions, such as decreased parent education and high levels of family stress. Nevertheless any of the most sophisticated studies point to the early childhood period as the stage in which children are most vulnerable to economic deprivation [Duncan and Brooks-Gunn 1997]. This might be expected, given the greater malleability of early development and the overwhelming importance of the immediate environment of relationships (i.e., within the family, in contrast to school or peer contexts) for infants, toddlers, and preschoolers [Bronfenbrenner and Morris, 1988; Duncan and Brooks-Gunn, 1998] (Center on the Developing Child 2007).

Although the study has not yet been released, a December 2, 2008 press release by Robert Sanders from University of California Berkeley discussed the effect environmental conditions can have on brain development for young children:

A study recently accepted for publication by the Journal of Cognitive Neuroscience, scientists at UC Berkeley's Helen Wills Neuroscience Institute and the School of Public Health report[s] that normal 9- and 10-year-olds differing only in socioeconomic status have detectable differences in the response of their prefrontal cortex, the part of the brain that is critical for problem solving and creativity... 'These [low socioeconomic] kids have no neural damage, no prenatal exposure to drugs and alcohol, no neurological damage,' Mark Kishiyama [cognitive psychologist and first author] said. 'Yet, the prefrontal cortex is not functioning as efficiently as it should be. This difference may manifest itself in problem solving and school performance.'

The researchers [Kishiyama, Robert Knight, and W. Thomas Boyce, UC Berkeley professor emeritus of public health who currently is the British Columbia Leadership Chair of Child Development at the University of British Columbia (UBC)] suspect that stressful environments and cognitive impoverishment are to blame, since in animals, stress and environmental deprivation have been shown to affect the prefrontal cortex. UC Berkeley's Marian Diamond, professor of integrative biology, showed nearly 20 years ago in rats that enrichment thickens the cerebral cortex as it improves test performance. And as Boyce noted, previous studies have shown that children from poor families hear, 30 million fewer words by the time they are four than do kids from middle-class families.' In work that we and others have done, it really looks like something as simple and easily done as talking to your kids' can boost prefrontal cortex performance,[' Boyce said... 'It's not a life sentence," Knight emphasized. 'We think that with proper intervention and training, you could get improvement

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in both behavioral and physiological indices.’ (Sanders 2008).

In the same vein, employment-based income supports for low-income families have been associated with positive effects on children’s cognitive and school outcomes. “Although some studies produce larger estimates, the most reliable research—randomized experimental trials—estimates that family support programs improve both cognitive and social development by perhaps 0.10 standard deviations” (Barnett and Belfield 2006).

The Center on the Developing Child at Harvard University reported in 2006, “Two well-designed sets of studies have shown that employment-based boosts in family income can produce achievement gains in young children. One, using data from random-assignment program evaluations of welfare-to-work initiatives, found that earnings supplements that increased family income by \$1,000 to \$1,500 per year were consistently associated with small, positive impacts on the achievement of preschool-aged children, although the same policies had negative effects on children entering adolescence [Morris, Duncan, and Clark-Kauffman 2006] (Center on the Developing Child 2007). And the National Forum for Early Childhood Program Evaluation has found, “For low-income families, work-based income supplements have been demonstrated to boost the early school achievement of young children. Policy options include expanded income tax credits for low-income families and welfare reform policies that ‘make work pay’ by providing more income as parents make transitions from welfare to work” (Magnuson, Yoshikawa and Brooks-Gunn 2008).

In Dahl and Lochner’s examination of research while preparing for a study on the impact of family income on achievement, they found some research-based explanations for such results, but noted that the results were not accounting for mediating factors. Taking these factors into account for their own study, they found that income supports can impact children’s achievement in math and reading.

Researchers have provided several explanations for why family income might affect child development. First, poverty is associated with increased levels of parental stress, depression, and poor health – conditions which might adversely affect parents’ ability to nurture their children. For example, in 1998, 27% of kindergartners living in poverty had a parent at risk for depression, compared to 14% for other kindergartners (Child Trends and Center for Child Health Research, 2004). Low income parents also report a higher level of frustration and aggravation with their children, and these children are more likely to have poor verbal development and exhibit higher levels of distractibility and hostility in the classroom (Parker et. al, 1999). Extra family income might...matter if parents use the money for child-centered goods like books, for quality daycare or preschool programs, for better dependent health care, or to move to a better neighborhood...While these papers represent a significant step forward, they do not control for endogenous transitory shocks and they may suffer from severe attenuation bias, since growth rates in income are noisily measured...

Our results indicate that current income has significant effects on a child’s math and reading test scores. Our estimates imply that a \$1,000 increase in income raises math test scores by 2.1% and reading test scores by 3.6% of a standard deviation. The results are even stronger when looking at children in families most likely to be affected by the large changes in the EITC, and are robust to a variety of specifications, including the inclusion of maternal labor supply. We also find some evidence of interesting dynamic relationships between past income and current outcomes, although we are limited in the dynamics we can incorporate. Finally, we uncover evidence consistent with the hypothesis that families are forward-looking and that expectations about future income affect child outcomes (Dahl and Lochner 2005, 4-5; 29-30).

Child Trends highlighted some Minnesota-specific supports. “Some experimental interventions for low-income families (including the New Hope Project and the Minnesota Family Investment Program) have provided wage supplements or

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earnings disregards to increase family income and have seen some positive effects on children's cognitive and school outcomes (Huston et al., in press; Knox, Miller, and Gennetian, 2000)" (Zaslow, Calkins, and Halle 2000, x). The MDRC (formerly the Manpower Developmental Research Corporation) released a report in 2005 examining the "Six Year Impacts on Parents and Children from the Minnesota Family Investment Program" which found that children in the most disadvantaged families appear to have benefited the most from MFIP, particularly with respect to fifth-grade outcomes. MFIP nearly doubled the proportion of disadvantaged children (ages 2 to 5 at study entry) who met grade-level expectation in fifth-grade reading and math (Gennetian, Miller, and Smith 2005, 39).

Question Five: What skills and abilities do kindergarten teachers feel are important for children to have upon entering kindergarten?

Kindergarten teachers evaluate readiness based on research-based indicators of social and emotional development, physical development and health, as well as approaches to learning in the areas of reading, writing, math, logic, science, social science, creativity, and the arts. When asked about the importance of various indicators, teachers place the least emphasis by far on academically-oriented skills, such as knowing letters and counting, because they can and do teach these skills in kindergarten. Parents, however, place higher emphasis on academics. Consequences of the varying expectations are not well documented.

More information, evidence and sources

In 2005, the Minnesota Department of Education released "Early Childhood Indicators of Progress: Minnesota's Early Learning Standards." Kindergarten teachers evaluate incoming students on these merits, which may influence teachers' ideas about levels of importance. For a complete outline of standards, see the publication available on the Minnesota Department of Education Web site (the publication offers an overview on pp. 58-60): <http://education.state.mn.us/mdeprod/groups/EarlyLearning/documents/Publication/009530.pdf>

The following indicators apply to children in the "preschool period" of ages three to five. They are based on expectations for children approximately four years of age:

Social and emotional development, including self concept as well as social competence and relationships.

Approaches to learning, including curiosity, risk-taking, imagination and invention, persistence, reflection and interpretation, listening, speaking, emergent reading, and emergent writing.

Speaking indicators include: Communicates needs, wants, or thoughts through non-verbal gestures, actions, expressions, and/or words; Communicates information using home language and/or English; Speaks clearly enough to be understood in home language and/or English; Uses language for a variety of purposes; Uses increasingly complex and varied vocabulary and language; Initiates, asks questions, and responds in conversation with others.

Emergent reading indicators include: Initiates stories and responds to stories told or read aloud; Represents stories told or read aloud through various media or during play; Guesses what will happen next

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in a story using pictures as a guide; Retells information from a story; Shows beginning understanding of concepts about print; Recognizes and names some letters of the alphabet, especially those in own name; Begins to associate sounds with words or letters.

Emergent writing indicators include: Understanding that writing is a way of communicating; Uses scribbles, shapes, pictures, or dictation to represent thoughts or ideas; Engages in writing using letter-like symbols to make letters or words; Begins to copy or write own name.

Creativity and the arts, including creating, responding (show & tell, recognizing others' work), and evaluating.

Mathematical and logical thinking, including number concepts and operations, patterns and relationships, spatial relationships/geometry, measurement, and mathematical reasoning (using simple strategies to solve math problems).

Number concepts and operations indicators include: Demonstrates increasing interest in and awareness of numbers and counting; Demonstrates understanding of one-to-one correspondence between objects and number; Demonstrates ability to count in sequence; Demonstrates ability to state the number that comes next up to 9 or 10; Demonstrates beginning ability to combine and separate numbers of objects.

Scientific thinking and problem solving, including observing, questioning, and investigating.

Social systems understanding, including human relationships, understanding the world, gross motor development, fine motor development, physical health and well being.

It's worth noting that while kindergarten teachers seem to embrace the research-based notion of multi-faceted school readiness, they are faced with families' sense that academic readiness matters most. In 2004, a review of literature conducted by the Southwest Educational Development Laboratory found that "Families and teachers tend to have somewhat different perceptions about what matters most in children's readiness for kindergarten" (Boethel et. al. 46).

"Results from. . .two studies indicated that families from all types of backgrounds are concerned about their children's readiness and 'think that a variety of academic and behavioral skills are important for children's success in kindergarten' (Diamond, Reagan & Bandyk, 2000, p. 97; see also Piotrkowski, Botsko, & Matthews, 2000). . . Piotrkowski [et.al.]...found that 'parents placed a greater emphasis on academically-oriented skills than teachers did' (p. 553). . . Zill and West (2001), citing an earlier National Center for Education Statistics survey, note, 'Most teachers feel that knowing letters and numbers is not crucial for school readiness because they can and do teach children these skills in kindergarten' (p. 3)" (Boethel et. al. 46).

The National Center for Education Statistics survey Zill and West referred to was conducted in 1995. Among the findings: "Nearly two-thirds of preschoolers' parents rated all four of the behavioral items as very important or essential for a child entering kindergarten as compared with less than one-third of public school kindergarten teachers. Differences between parents and teachers are also large for the school-related skill items. A higher percentage of parents of preschoolers (41 percent) rated all three of these items as very important or essential, compared with only 4 percent of the teachers" (West 1995).

In 2007, teachers again voiced a preference for social skills over academic skills in a study conducted by Harris Interactive for The PNC Financial Services Group, Inc. Teachers said the two most important skills for entering kindergarten

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ready to learn are: (1) the ability to listen and follow rules and directions (92 percent); and (2) the ability to interact, play, and share well with others (93 percent). Teachers reported that just 8 percent and 10 percent of students, respectively, had these skills. Again, less important to teachers were academic skills such as being able to sort and identify objects by shape, size and color (46 percent) and being able to recognize common words and signs (44 percent) (Harris Interactive 2007).

SEDL notes that consequences of the different expectations are not yet well documented in research, but that schools ought to be aware of them. Anecdotal stories can be found in newspaper articles in which parents report fears that their child is academically over-prepared for kindergarten, that families and child advocates wonder if schools are not well-prepared to handle students arriving with more early education, and teachers' concerns that students are not socially prepared.

Question Six: Which children have been shown to benefit most from early childhood education?

A sample of recent high-quality studies shows that intensive early childhood programs for disadvantaged students can have a positive impact, but the results for large federal programs are mixed. Benefits are less clear for middle- and upper-income children.

More information, evidence and sources

In the Fall 2008 issue of *Education Next*, Douglas Besharov and Craig Ramey had a written debate about the questions associated with research examining who benefits from early childhood education. The article states that this question is increasingly of interest as state after state expands government pre-K schooling. Both Besharov and Ramey asserted that early childhood education research shows benefit to “low resource families,” especially when programs are intensive (including provision of services to parents). Benefits are less clear for middle- and upper-class families. Some efforts to replicate successful programs that were developed in the 1960s and 1970s have achieved benefits for disadvantaged children when implemented at the state or local level (such as ProjectCARE), but not at the federal level (such as Head Start, Early Head Start, and Even Start). Besharov warns of legislative proposals that aim to include all children, including the middle-class, might distribute resources such that disadvantaged populations will not receive the intensive services that seem to be required for programs success. “...Preschool will become a new middle-class entitlement, displacing the more intensive (and extensive) efforts needed to shrink the achievement gap among severely disadvantaged children” (Besharov and Ramey 2008).

An excerpt of their discussion follows:

Douglas Besharov, director of the Social and Individual Responsibility Project at the American Enterprise Institute and former director of the U.S. Center on Child Abuse and Neglect:

The idea that early childhood education ‘works’ stems largely from the widely trumpeted results of two experimental programs operated in the 1960s and 1970s. Both the Perry Preschool Project and later the Abecedarian-

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Project reported substantial initial gains in cognitive indicators followed by significant long-term improvements in later school performance, rates of teenage and nonmarital births, and employment and earnings.

Debate continues about the validity of these findings, but there is no denying that these programs operated in a far different social and demographic setting than programs today and that they were 'hothouse' programs: Run by top-notch specialists, the programs served fewer than 200 children, cost at least \$15,000 per child per year in today's dollars, often involved multiple years of services, had well-trained teachers, and instructed parents on effective child rearing. Significantly, the children they served had low IQs or had parents with low IQs. Since these two pioneering initiatives, no other rigorously evaluated programs have had similar results, despite many efforts to replicate them (Besharov and Ramey 2008).

Craig Ramey, professor of health studies and psychiatry at Georgetown University and director of the Georgetown Center on Health and Education:

The evidence is quite strong in favor of early education benefits, particularly for children from low-resource families. Low-resource families have limited parental education, very low family incomes, and/or parents unable to consistently provide high-quality learning opportunities essential for normal brain and behavioral development. Early education yields results in terms of later academic achievement that are greater and last longer than do educational interventions that begin after failure in school. The Abecedarian Project was not a one-time hothouse program; it was immediately replicated with a new group of similar children (in [Project CARE](#)) who demonstrated equal benefits throughout their school years and early adulthood. Next, we adapted this educational intervention for low birth-weight and premature children in the [Infant Health and Development Program](#), conducted in eight cities with 985 participants, and found benefits in all eight cities, with the greatest benefits for children from families with the lowest levels of parent education. The last time these children were assessed, at age 18, they showed continued benefits from their early education. Other rigorously studied interventions include the Milwaukee Project and the Chicago Parent-Child Centers, which served thousands of children in multiple locations and resulted in long-term gains (Besharov and Ramey 2008).

Besharov:

However one interprets the evaluations of demonstration projects like the Perry Preschool and Abecedarian, the unavoidable conclusion is that the measured impacts of three national programs that seek to implement their approach—[Head Start](#), [Early Head Start](#), and [Even Start](#)—have been tragically “disappointing,” the word used by most objective observers.

According to repeated evaluations, these three programs do not make a meaningful difference in the lives of disadvantaged children. Here's just one example: After almost a year in Head Start (with an average cost of about \$7,700 in 2005), children were able to name only about two more letters than their non-Head Start counterparts, and they did not show any significant gains on much more important measures, such as early math learning, vocabulary, oral comprehension (more indicative of later reading comprehension), motivation to learn, or social competencies, including the ability to interact with peers and teachers. ..

I read the research literature to say that early education programs can probably make a marked improvement in the lives of disadvantaged children, but that we have only a partial idea of how they should be organized and managed, that is, brought to scale. As of now, there is no actual model of early education or preschool services

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that has been proven successful in closing the achievement gap, and any additional funding should be used to create a flexible system that can change, and improve, as more knowledge is accumulated.

It is possible that the children from middle-income families might also benefit from preschool programs. The danger is that preschool will become a new middle-class entitlement, displacing the more intensive (and extensive) efforts needed to shrink the achievement gap among severely disadvantaged children. We need separate policies for each purpose, and bundling them together is a sure recipe for a new middle-class benefit that short-changes the poor (Besharov and Ramey 2008).

In a 2006 study, Barnett and Belfield address the lack of research on the impact of early education on children from middle- and upper-income families:

There is relatively little basis for estimating the effects of intensive educational interventions on children from middle-income or highly advantaged families. Few researchers have addressed the topic at all, and even fewer have done so in a rigorous way. The only randomized trial of a preschool program for a highly advantaged population (average IQ was 2 standard deviations above the mean) had a very small sample, limiting its ability to detect effects. Nevertheless it found modest improvements in early academic abilities, at least for boys. The Tulsa study and the later five-state evaluation of preschool education provide some insights, as Oklahoma and West Virginia both serve the general population, not just disadvantaged children, and the other three states also serve populations with some socioeconomic variation. Both studies find that effects are somewhat larger for disadvantaged children (Barnett and Belfield 2006).

Question Seven: What types of benefits can be expected from early childhood education?

Studies examining the benefits of early childhood education reveal a mixture of short- and long-term benefits for children and families and benefits for the nation at large. Significant benefits emerge for specific, well-designed and implemented interventions for highly disadvantaged children. Some researchers emphasize that these benefits are frequently overstated, setting up unrealistic expectations for early care and education outcomes. It's also important to note that the primary benefits are related to factors other than closing the educational achievement gap. Findings suggest early benefits in cognition and academic achievement from some programs fade by early elementary grades, which some suggest points to the need to address inadequate K-12 public school design and/or poor quality schools in low-income neighborhoods. Some studies report that intensive participation leading to higher cognitive benefits can also lead to a higher likelihood of problematic behaviors.

More information, evidence and sources

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Benefits for children and families

In their review of the research, Adams et al. found that pre-K improves language development, literacy and cognitive skills as well as fine motor development. However, these improvements typically fade after first grade (Adams et al.,

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2004). Russell W. Rumberger and Loan Tran at the University of California Santa Barbara found in January 2006 that students who attended preschool, especially non-Head Start programs, had higher levels of school readiness (as evidenced by more advanced cognitive development, reduced likelihood for repeating kindergarten, and reduced likelihood of being identified as having a disability.) “But preschool participation was also associated with an increased likelihood of exhibiting external behavior problems” (Rumberger and Tran 76). The authors indicated that their study controlled for the effects of some differences in the characteristics of students and their families that may be related to both participation in preschool and to cognitive development in kindergarten. The results, which the authors say, apply to all students no matter what their language background with only a few exceptions, “also vary by duration and intensity of participation, with earlier and more intensive participation yielding higher cognitive benefits, but also higher likelihood of problematic behaviors” (Rumberger and Tran 76).

The modest cognitive gains faded, however. Rumberger and Tran found that four years after kindergarten “differences in cognitive development by preschool participation remained modest” and that “when we estimated a statistical model that controlled for the same set of predictors as we did for fall kindergarten scores, the estimated effects of preschool became inconsequential, although still statistically significant. Overall, the cognitive effects of non-Head Start preschool programs were reduced to about half...” The researchers reported that their findings are “consistent with other studies that found Head Start participants in particular are more likely to attend lower quality schools, which may help explain why the cognitive benefits fade over time (Lee & Burkam, 2002; Lee & Loeb, 1995)” (Rumberger and Tran 77). They also found, “Effects on retention and special education remained small (although larger than the effects on achievement); nonetheless, they did not change appreciably from kindergarten, which suggests they are more likely to be sustained in higher grades” (Rumberger and Tran 77). Rumberger and Tran conclude, “...Preschool alone may have limited use as a long-term strategy for improving the achievement gap without strengthening the schools these students attend or without providing additional support during the school years” (Rumberger and Tran 79-80).

In 1995, W. Steven Barnett also discussed evidence early education’s impact on achievement in *The Future of Children*. “Evidence on grade retention and special education is overwhelming. Evidence is weaker for persistent achievement effects... Evidence for effects on high school graduation and delinquency is strong but based on a smaller number of studies. These effects are large enough and persistent enough to make a meaningful difference in the lives of children from low-income families...Evidence about when programs should begin and how long they should last is mixed” (Barnett 43).

As for variance by population, Barnett concluded that long-term effects on educational achievement and attainment might be greater for girls than for boys. They are also a function of where children learn: the program and at home. “Indeed, the best predictor of the size of the program effects may be the size of the gap between the program and home as learning environments, rather than whether a child is a member of a particular group. Thus, effects might be expected to be largest for the most disadvantaged, though there is no evidence that meaningful effects cease if a child’s family moves above the poverty line. Indeed, there is even some suggestion at the other end of the income spectrum that children from very well-off families may suffer from [programs and care] inferior to that provided by their homes” (Barnett 43).

In 2005, a UC Berkeley and Stanford study called “How Much is Too Much?” found that children in middle- and upper-class homes experienced modest gains compared to their friends who “remained at home.” Researchers concluded that children from the very poorest homes appear to gain the most from preschool programs. But they also concluded that preschooling suppressed children’s social development. “We find that attendance in preschool centers,

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even for short periods of time each week, hinders the rate at which young children develop social skills and display the motivation to engage in classroom tasks, as reported by their kindergarten teachers... Our findings are consistent with the negative effect of non-parental care on the single dimension of social development first detected by the National Institute of Child Health and Human Development research team. [A] pattern – strongest gains in cognitive growth for children entering between 2 and 3 years of age, yet negative social-behavioral effects from such early entry – are observed consistently across ethnic and family-income groups” (Loeb et al. 2005). These findings are consistent with those of Rumberger and Tran, above.

Responding to state legislatures’ increasing consideration for more government preschool and kindergarten programs, Darcy Olsen, President and CEO of the Goldwater Institute (like Rumberger and Tran) questioned continued allocation of resources to early childhood without addressing the inadequacies of K-12 public education. Olson asserted that given the trend toward developmentally inappropriate academic instruction, and no evidence of long-term cognitive gains, mandated government programs put children “at risk for no apparent gain.” She wrote, “The phenomenon known as ‘fade out’ is important to discussions of preschool and kindergarten because it means that early schooling may not measurably affect a child’s later academic performance. However, if fade out occurs, not because programs are ineffective, but because the schools children later attend are unable to maintain those gains, then it is reasonable to conclude that preschool and kindergarten will not result in lasting gains unless or until elementary and secondary schools are significantly improved. Either conclusion points invariably to the need for reform within the current school system” (Olsen 2005).

Benefits for the nation at large

A 2005 RAND study focused on twenty programs that provide child development services from the prenatal period until kindergarten entry and that had scientifically sound evaluations. Eight services involved home visiting or parental education only, ten involved home visiting or parental education with early childhood education, and one involved early childhood education only.

These nineteen early intervention programs demonstrated significant and often sizable benefits in at least one of the following domains: cognition and academic achievement, behavioral and emotional competencies, educational progression and attainment, child maltreatment, health, delinquency and crime, social welfare program use, and labor market success. In some cases, the improved outcomes in these domains were demonstrated soon after the program ended; in other cases, the favorable impacts were observed through adolescence and in the transition to adulthood. In the case of the Perry Preschool Program, lasting benefits in multiple domains have been measured thirty-five years after the intervention ended.

Even though findings suggest that early benefits in terms of cognition or school achievement may eventually fade, the evidence indicates that there can be longer-lasting and substantial gains in outcomes such as special education placement and grade retention, high school graduation rates, labor market outcomes, social welfare program use, and crime. A few studies indicate that the parents of participating children can also benefit from early intervention programs, particularly when they are specifically targeted by the intervention (Karoly, Kilburn and Cannon 2005).

A conference hosted by Legal Momentum and the MIT Workforce Center in 2005 brought together some 80 scholars, experts, and activists from around the nation to examine the economics of early childhood education. After reviewing evidence, they determined the following short and long term economic benefits:

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Short-term:

- Provides jobs: employs nearly 3 million people nationwide
- Employees spend wages and pay taxes
- Centers purchase goods and services
- Enables employers to attract and retain employees and increase productivity

Long-term:

- Lower cost for remedial and special education, and grade repetition
- More school completion and skills
- Better job preparedness and ability to meet future labor force demands
- Higher incomes and tax payments from those who complete school
- Lower criminal justice and prison costs
- Fewer welfare payments (Calman and Tarr-Whelan 2).

Numerous other studies assessing the costs and benefits of investment in early childhood education reach the conclusion that the economic returns outweigh the costs. See the Public Policy Forum's *Research on Early Childhood Education Outcomes* for links and overviews: <http://www.publicpolicyforum.org/Matrix.htm>.

The RAND study seeks to explain the variation in the rates of return documented in research:

Researchers have conducted benefit-cost analyses, using accepted methodologies, for a subset of the programs we identified as having favorable effects. For those programs with benefits that could readily be expressed in dollar terms and those that served more-disadvantaged children and families, the estimates of benefits per child served, net of program costs, range from about \$1,400 per child to nearly \$240,000 per child. Viewed another way, the returns to society for each dollar invested extend from \$1.80 to \$17.07. Some of the largest estimates of net benefits were found for programs with the longest follow-up, because those studies measured the impact for outcomes that most readily translate into dollar benefits (e.g., employment benefits, crime reduction). Large economic returns were found for programs that required a large investment (over \$40,000 per child), but returns were also positive for programs that cost considerably less (under \$2,000 per child). Programs with per-child costs in between these two figures also generated positive net benefits. The economic returns were favorable for programs that focused on home visiting or parent education as well as for programs that combined those services with early childhood education.

Because not all benefits can be translated into dollar values, these benefit-cost estimates for effective programs are likely to be conservative. Moreover, such analyses do not incorporate some of the other potential benefits that were not measured in the studies. These might include improved labor market performance for the parents of participating children, as well as stronger national economic competitiveness as a result of improvements in educational attainment of the future workforce. It is important to note that these findings represent the potential effects of well-designed and well-implemented interventions. They do not necessarily imply that all such early child

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hood interventions, delivered for any given amount of time, would generate benefits that offset costs (Karoly, Kilburn and Cannon 2005).

In the Fall 2008 issue of *Education Next*, Craig Ramey, professor of health studies and psychiatry at Georgetown University and director of the Georgetown Center on Health and Education also offered insights about how to interpret the calculations presented in the various cost-benefit analyses:

There have been several different methods used to calculate benefits—and wildly different returns claimed—sometimes as high as \$16 returned for \$1 invested (definitely not realistic returns for most children and communities) to more conservative estimates of \$1.40 returned for \$1 invested (far more sustainable and based solely on costs to the public). A similarly high rate of return is unlikely for most current and proposed pre-K programs because many of the children being served have relatively low levels of risk for school failure, placement in special education, later criminal behavior, or failure to become economically self-sufficient in adulthood. The largest benefits claimed economically come from a relatively small study of 123 children in the Perry Preschool Program, where all of the children by age three were performing in the category now labeled developmentally or cognitively delayed (IQ scores below 85 prior to entering the program). This fact is seldom shared in public venues where a community is fighting to obtain support for expanding or improving its supports to vulnerable young children. By overstating the economic return, advocates may be creating unrealistic expectations and ultimately dooming the long-term community support for providing high-quality educational programs to all young children. [underline added for emphasis]

The largest short-term savings will be from reduced grade repetition (cut in half in the Abecedarian Program) and special education costs (reduced by 75 percent in the Abecedarian Project). Special education tends to cost double what regular education costs, and special education students today are eligible for free education until the age of 21 (rather than 18) (Besharov and Ramey 2008).

Question Eight: What types of outcomes can be expected from full-day kindergarten?

A small body of reliable evidence indicates that attending full-day kindergarten results in academic benefits (higher standardized test scores, diminished retention, and more) and social benefits, although it seems that what children do during the kindergarten day is more important than the length of the day. Some researchers have shown that the benefits “fade out”, however, between third and fifth grade. For single-parent or two-income families, all-day kindergarten eliminates the difficulty of finding partial-day child care. Cultural groups express concern that children might lose valuable capacities and skills, including language and identity that can make them successful members of their cultural communities, when they begin to attend school.

More information, evidence and sources

The research reported in the answer to Question 7 is related to the answer to Question 8. The evidence suggests that social and cognitive outcomes of preschool vary for students and families with different characteristics, and that cognitive benefits (found for highly disadvantaged children) tend to fade by early elementary grades. It also suggests that quantified benefits represent the potential effects of well-designed and well-implemented interventions. “They

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do not necessarily imply that all such early childhood interventions, delivered for any given amount of time, would generate benefits that offset costs” (Karoly, Kilburn and Cannon 2005).

Given the answers to Question 7, the answer to Question 8 will report additionally the results of studies investigating outcomes of universal pre-K. Since universal pre-K was until 2005 available in just seven states, program evaluation of effectiveness is limited.

A 2003 study by Georgia State University examined the effects of the Georgia pre-K program that has existed since 1993. The lottery-funded program, open to any four-year-old living in the state, provides services through both public schools and private providers. In FY 2001-02, the pre-K program served 55% of the state’s four-year-olds. The results showed that children who attended pre-K made statistically significant gains on four tests of cognitive development, reaching or exceeding national norms on three. Children attending a private pre-K program generally scored higher than children attending the state program, although the gap between the two groups narrowed over time. When pre-K children from high poverty households were matched with a Head Start sample to understand the impacts on economically disadvantaged children, the researchers found Georgia’s pre-K to be more effective than Head Start in kindergarten preparation:

The two groups demonstrated equivalent skills on four of six assessments of language and cognitive skills, but the Pre-K children scored higher on the other two, at the beginning of their preschool year. The children with significant economic disadvantages who attended Georgia’s Pre-K Program were significantly better prepared for kindergarten than the children in Head Start on six of eight directly assessed measures of language and cognitive skills and four out of five skills ratings by kindergarten teachers after accounting for individual and family characteristics and selection bias (Henry August 2003, v).

A final report of longitudinal observations of the Georgia Program from 1996 to 2001 indicated that these outcomes may be short-term, however, with benefits fading by third grade. “Previous research has shown that cognitive gains as measured by standardized test scores are associated with preschool experiences but are not sustained in later years...It should not be surprising to find that the test scores of children, all of whom participated in a pre-K program four years before, are not systematically different [from the average performance of all Georgia third grade students]” (Henry May 2003, 44).

The Public Policy Institute at Georgetown University examined state-funded pre-K in Oklahoma [“a relatively poor...state” (Gormley 2007, 8)], which the report indicates is provided to approximately 70 percent of all four-year-olds. Georgetown researcher William T. Gormley examined results of the pre-K program in Tulsa Public Schools (TPS). Based on analysis of 2003 test score data for letter recognition, spelling, and applied problems, he reported that children can move ahead by “months” in their test scores:

Most incoming kindergarten students have better pre-reading skills, better pre-writing skills, and better pre-math skills. They are readier to learn [cognitively speaking] than they otherwise would be... A well-designed universal pre-K program can benefit children from diverse racial and ethnic backgrounds and from diverse social strata... The benefits compare quite favorably to those produced by other human investment initiatives, including class reduction programs and job training programs. ...The child exposed to TPS pre-K is substantially better off. Whereas the child not yet exposed to TPS pre-K falls below national norms for a five-year old (more precisely, a child who is exactly five years old) for all three tests, the child exposed to TPS pre-K exceeds national norms in Letter-Word Identification and equals national norms in Spelling. Expressed a bit differently, TPS pre-K yields test score gains of approximately seven

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months for Letter-Word ID, six months for Spelling, and four months for Applied Problems (Gormley 2007).

Gormley points out that these results report on short-term effectiveness and questions the sustainability of the impact if K-12 education is not addressed as well. He also states that it's unclear which factors in the design and implementation of the Oklahoma pre-K are related to these results.

The Reason Foundation reports Oklahoma outcomes from a different perspective, perhaps shedding light on Gormley's sustainability questions. According to the Reason Foundation, Oklahoma has had state-funded pre-K for 18 years, and offered universally for nearly a decade. During that time, students' fourth and eighth grade reading scores have fallen below the national average on the National Assessment of Education Progress despite schools' good quality ratings, and have slipped lower than where they were prior to the pre-K program.

Oklahoma scores fell from one point above the national average in fourth grade math in 1992 to two points behind in 2007. They also slipped behind in eighth grade math, from one point ahead before the pre-K program to five points behind the national average after pre-K was implemented. In reading eighth grade scores slipped from four points ahead in 1998 to one point behind. And Oklahoma's fourth grade reading scores plummeted during the 1990s at the very same time the state was aggressively expanding preschool access, attendance, and building a system that the National Institute of Early Education Research (NIEER) rates as a 9 out of 10 on quality (Snell 2008).

W. Steven Barnett et al. noted in the introduction to an October 2007 study examining the outcomes of state prekindergarten programs (not necessarily universal) that there is variation between state programs and the programs providing the strongest evidence for improvement. "Compared to the programs providing the strongest evidence, state prekindergarten programs tend to be shorter in duration (most start at age 4) and less intensive, and to serve more diverse populations" (Barnett et al. 2007). The researchers also pointed out a difficulty in assessing the effectiveness of universal pre-K. "It may be practically impossible to find comparable children who do not attend the state preschool program, at least in communities where the program is offered" (Barnett et al. 2007). As in the studies discussed in Question 7, Barnett et al. found that the effects of state-funded preschool programs were meaningful but modest, and most extensive for print awareness.

Question Nine: What types of outcomes can be expected from universal preschool?

Gains from state-funded preschool programs are modest in the short-term, but researchers question sustainability of the outcomes. Some studies indicate that the benefits fade. For example, since Oklahoma has been offering state-funded universal pre-K over the past decade, fourth and eighth grade reading scores have fallen below the national average despite schools' good quality ratings, according to the Reason Foundation. The foundation reports that the scores are lower than they were prior to the pre-K program. Other research points out that state programs vary, in design and population served, from the programs that provide the strongest evidence for improvement.

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More information, evidence and sources

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Gormley points out that these results report on short-term effectiveness and questions the sustainability of the impact if K-12 education is not addressed as well. He also states that it's unclear which factors in the design and implementation of the Oklahoma pre-K are related to these results.

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Question Ten: Is there any consensus on the role of assessment for kindergarten children?

Societal and governmental initiatives promote and require accountability, so assessment is increasingly required. Having assessments that are of value and without negative consequence requires fundamental attention to their purpose and the design of the larger systems in which they are used. The data gained from testing child-

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ren at kindergarten entry need to be interpreted carefully. Some assert that we should expand the focus of assessment from whether children are ready for kindergarten, and whether early programs are preparing them, to giving schools the information they need to prepare schools for the diverse group of children they will be serving.

More information, evidence and sources

According to the National Research Council, private and government early childhood programs are to enhance the school readiness of all young children, including their social, language, and academic skills, as they develop and learn in their early years. The programs also constitute a site where children with developmental problems can be identified and receive appropriate interventions. In this context, societal and governmental initiatives promote and require program evaluation and accountability for programs, particularly those that are publicly funded.

Assessment is a tool for determining if programs are meeting their goals. 'High stakes' assessments can have major consequences for large numbers of children and families, for the community served by the program, and for policy, so it's likely that decisions about individual children and programs will need to be defensible. Defensible assessment requires knowing the answer to two questions: what are the important outcomes for this age group and what are the quality and purposes of different techniques and instruments for developmental assessments? In 2006, Congress asked the National Research Council to identify the answers to these questions.

In 2008, the National Research Council released an advance copy of its findings in a report, "Early Childhood Assessment: Why, What, and How?" The Council concluded that having assessments that are of value and without negative consequence "requires fundamental attention to their purpose and the design of the larger systems in which they are used [underline added for emphasis]... Assessments can make crucial contributions to the improvement of children's well being, but only if they are well designed, implemented effectively, developed in the context of systemic planning [including medical, educational, and family support services] and are interpreted and used appropriately" (National Research Council 2008, S-7).

The purpose and system principles apply for several reasons:

"Young children are currently being assessed for a wide array of purposes, across a wide array of domains, and in multiple service settings. The increase in the amount of assessment raises understandable worries about whether assessments are selected, implemented, and interpreted correctly" (National Research Council 2008, S-1).

"Different purposes require different types of assessments, and the evidentiary base that supports the use of an assessment for one purpose may not be suitable for another" (National Research Council 2008, S-1).

"Assessment must reflect the highest standards of evidence in three domains: the psychometric properties of the instruments used in the assessment system; the evidence supporting the appropriateness of the assessment instruments for different ethnic, racial, language, functional status, and age group populations; and the domains that serve as the focus of the assessment" (National Research Council 2008, S-2).

"Resources need to be directed to the training of assessors, the analysis and reporting of results, and the interpretation of those results" (National Research Council 2008, S-2).

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In regard to the interpretation, use, and communication of assessment data:

“Collecting data should be preceded by planning how the data will be used, who should have access to them, in what decisions they will play a role, and what stakeholders need to know about them” (National Research Council 2008, S-2).

“Ideally, any assessment activity benefits children by providing information that can be used to inform their caregivers and teachers, to improve the quality of their care and educational environments and to identify child risk factors that can be remedied. But assessments may also have adverse consequences. Direct assessments may make children feel anxious, incompetent, or bored, and indirect assessments may constitute a burden on adults. An assessment activity may also deflect time and resources from instruction, and assessments cost money. It is therefore important to ensure that the value of the information gathered through assessments outweighs any negative effects on adults or children and that it merits the investment of resources” (National Research Council 2008, S-2).

In the summary, the National Research Council says more is required for well-planned and effective assessment:

Purposeful and systematic assessment requires decisions about what to assess. In this study, National Research Council focuses on five domains that build on the school readiness work of the National Education Goals Panel (1995):

1. physical well-being and motor development,
2. social and emotional development,
3. approaches toward learning,
4. language development (including emergent literacy), and
5. cognition and general knowledge (including mathematics and science).

This list reflects state early learning standards, guidelines from organizations focused on the welfare of young children, and the status of available assessment instruments. The domains are not specific about many areas of potential interest to parents, to educators, and to society, such as art, music, creativity, prosocial behavior, and morality. Also, for some purposes and for some children, including infants and preschool children with disabilities, a functional rather than a domain-specific approach to assessment may be appropriate.

Once a purpose has been established and a set of domains selected, the next challenge is to identify the best assessment instrument; this may be one that is widely used, or an adaptation of a previously used instrument, or in some cases a newly developed instrument. The varied available approaches, which include conducting direct assessments, interviewing parents or teachers, observing children in natural or slightly structured settings, and analyzing their work, all constitute rich sources of information. Issues of psychometric adequacy, in particular the validity of the instrument chosen for all the subgroups of children to be considered, are paramount, for observational and interview instruments as well as direct assessments (National Research Council 2008, S-2 and S-3).

Guidelines for purposes, domains and measures, instrument selection and implementation, and systems are outlined in detail throughout the National Research Council report.

The National Research Council's charge from Congress comes in the context of ensuring accountability for the increase

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ing number of government-provided and/or mandated early childhood programs, yet the Council seems careful in its work to leave room for assessment as a useful tool for educators and families who are not taking part in these programs to track developmental and learning progress. Given that formal early education is not a requirement, it makes sense that progress can be measured and appropriate interventions can be sought outside of a public education environment.

The National Research Council does not go so far as to suggest purposes for assessment, asserting only that the purposes should be explicit and public. At least several researchers and advocacy groups—some mentioned in answers to other questions—have raised concerns that assessments will be used to keep students out of school because they're not ready for what schools are currently designed to teach. They suggest that assessment might be extended to focus increasingly on schools, programs and services' readiness for children who are at varying stages of readiness at kindergarten entry. The consensus is that little to no research focuses on assessment from this perspective. Instead, measures seem to focus on students' response to the existing system, placing creating the opportunity for students to bear the blame for not responding well. It's possible that if students are not responding well, however, that demand will increase for system redesign.

In the July 2008, Pamela High et. al. asserted the idea of redefining assessment for 'school readiness' in *Pediatrics*, the official journal of the American Academy of Pediatrics:

The current disparity between school and child readiness may be because schools are not prepared to offer the necessary and appropriate educational setting for age-eligible children, not because children cannot learn in an appropriate educational setting. If there is a predetermined set of skills necessary for school enrollment, then commitment to promoting universal readiness must address early-life inequities in experience. This may be accomplished by providing access to opportunities that promote educational success, recognize and support individual differences among children, and establish reasonable and appropriate expectations of children's capabilities at school entry for all children. The data gained from testing children at kindergarten entry need to be interpreted carefully. Ideally, data can be used as a tool to help prepare schools for the diverse group of children they will be serving, rather than as a means of excluding children from formal education at their potential entry point. [underline added for emphasis] It is the responsibility of the schools to be ready for all children and to work with families to make the school experience more positive for all children, even those who may be at varying stages of readiness. School programs should be flexible and adaptable to each child's level of readiness (High et. al. 2008, e1010).

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