



EDUCATION

SMART START

Kids in preschools that encourage them to play with language and focus their attention do better in school and later life

By Lisa Guernsey

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AWN BRADLEY, AN EARLY-CHILDHOOD TEACHER, HAS SPENT enough time with three-, four- and five-year-olds to know that they often do not get the credit they deserve. Children “are just told to follow orders or are told to only answer yes-and-no questions,” she says. But in five years of teaching at Libertas School of Memphis in Tennessee, Bradley has seen kids persistently try to solve math problems until they get them right, learn to show courtesy when they accidentally bump into a friend, and ask astute questions about parts of insects or features of the nearby Mississippi River.

In many preschool classrooms in the U.S., children are asked to do little more than identify shapes and letters and sit quietly on rugs during story time. But a growing body of research is overturning assumptions about what early education can look like. The studies back up what Bradley sees in her work: when children learn certain skills, such as the ability to focus attention—skills that emerge when teachers employ games and conversations that prompt kids to think about what they are doing—the children do better socially and academically for years afterward. A study published last year, which tracked kids for a decade starting in preschool, found some evidence that children with teachers trained to foster such abilities may get better grades compared with children who did not get this type of education.

Politicians routinely promise to give more money to prekindergarten schooling, but there is now a new player on the scene with a particular interest in this kind of approach. About a year ago Jeff Bezos, the world’s richest man, pledged to donate at least \$1 billion to build a network of preschools accessible to children in low-income families and inspired by the Montessori program he attended in Albuquerque, N.M., as a child. Many Montessori programs emphasize this type of playful activity and choice making. His initiative is still taking shape, and it has not yet been announced how the money will be spent. But experts say that to do right for kids, any program will need to focus on at least two foundational skills: executive functioning and oral language.

Executive function involves a suite of cognitive skills, such as being able to hold an idea in one’s head and recall it a short time later (working memory), the ability to control impulses and emotions, and the flexibility to shift attention between tasks.

Oral language skills mean not just expressing sounds and words but using them in meaningful conversations that involve increasingly complex sentences.

“These are the fundamentals that lead to later success,” says Robert C. Pianta, dean of the Curry School of Education and Human Development at the University of Virginia. “And the more we learn about them, the more we learn what underpins the academic skills that we value.” The long-term benefits carry tremendous significance for children in low-income families. Not only are they the intended recipients of many public pre-K programs, but studies show they are more likely to enter first grade behind their peers in terms of their early literacy and math skills.

FOCUS FACTOR

EARLIER THIS YEAR a little girl in pink, age three and a half, with neat cornrows in her hair, stood at a wood table at Breakthrough Montessori, a public charter school in Washington, D.C. It was 10 o’clock in the morning. The little girl was cradling a fresh pomegranate and looking at an empty glass bowl that her teacher, Marissa Howser, had set up along with other carefully designed activities children could choose to do. Each one was meant to foster new competencies, such as completing tasks without an adult’s help and developing fine-motor coordination.

The pomegranate activity provides the incentive of making a midmorning snack, and the girl eagerly embarked on the challenge of separating the fruit’s glossy red seeds from the white pulp. Her tiny fingers pushed and pulled. Her face was set in concentration. “Oh, yeah, I got one!” she suddenly exclaimed. She dropped the seed into the bowl, then began to pry out another and another.

IN BRIEF

Many preschools teach children to memorize letters and numbers, but new research indicates early education should have other priorities.

Language skills, which are taught via conversation and guided play, form a strong foundation for later educational achievement.

The ability to focus and control impulses, which can be developed through games that require choices, also has a positive and long-lasting impact.



PULLING SEEDS from a fruit pod, a youngster at a Montessori public school boosts his ability to focus and learn while having fun.

working for at least 20 minutes without interruption or coaching.

Standing at a table deseeding fruit might not seem like an obvious first step on the path to success in school and life. But a few decades ago cognitive scientists and behavioral researchers began to examine how and when children develop the ability to “self-regulate”—to know when to control emotions and how to follow through on tasks even when they might be difficult. The girl’s persistent attempts to separate the slippery seeds showed that kind of follow-through. (The term “self-regulation” sometimes is used interchangeably with “executive function.”)

Clancy Blair, a developmental psychology professor at New York University, was one of the first researchers to design experiments to understand how executive function works in young kids. “I began by looking at what is influencing the development of executive function,” Blair says. “Could we cultivate it? Could we develop it?”

In some of the experiments by Blair and others, children were asked to play games that required them to remember rules and resist impulses to do other things. For example, one game was a peg-tapping game in which children were supposed to tap twice when a researcher tapped once, or vice versa. In 2005 Blair reported that stress had a marked impact on performance in this task. He tested the amount of the stress hormone cortisol in the saliva of game players. When levels climbed but then dropped—a sign that stress was dropping, too—children were better able to remember the game rules. Success at a task came not only from repetition but also from reducing stress during performance.

In addition to environments that allow them to be calm enough to focus, young children also need chances to practice this kind of concentration. Megan McClelland, a child development researcher at Oregon State University, and her colleague Shauna Tominey developed a suite of six games called Red Light, Purple Light to see whether playing them could help. One of the games is roughly similar to Simon Says—the rule is that you don’t do something until you get the proper signal. Another asks children to dance when the music plays and freeze when it stops.

In a 2015 study of 276 children in Head Start, the federally funded preschool program for low-income families, Sara Schmitt of Purdue University, along with her colleagues, including McClelland, found that playing the games twice a week led to higher executive functioning than that observed in a control group. They also found a significant link between better executive function scores and better math scores among Spanish-speaking English-language learners.

Opportunities to practice independence and autonomy may be another key ingredient. A 2018 study in the *Journal of Applied Developmental Psychology* links improvements in children’s executive function to the extent to which adults give them a little autonomy. Such results are driving interest in the Montessori model, which gives children chances to choose activities that show what they are capable of, whether it is matching similar colors or preparing snacks for the group. And several studies comparing low-income children in Montessori with

other low-income children have shown that Montessori students score better on tests of executive function. Researchers have hypothesized that the schools’ emphasis on independent choices is one reason.

Another approach under study is Tools of the Mind, which employs a combination of literacy and math activities, dedicated time for children to talk about their plans for learning, and pretend play with costumes and props. Deborah Leong, a professor emerita at Metropolitan State University of Denver, who designed the program with developmental psychologist Elena Bodrova, said they wanted to push learning but make school “more playful and avoid ‘drill and kill.’”

One version being used in kindergarten involves the Magic Tree House series of books, which feature Jack and Annie, two time-traveling kids who have adventures visiting landmarks and natural settings around the world at different times in history. Students can pretend they are Jack and Annie exploring the rain forest. While putting on costumes and strapping on backpacks, they talk about plans for their adventures and assign themselves roles. The Tools approach is also used in pre-K, but there it does not rely on the books. Instead kids might be asked to play roles in familiar settings such as managing a restaurant in their community or sending letters through a post office, loosely guided by a teacher but coming up with specific ways to accomplish the tasks themselves. “The level of engagement in a Tools classroom is off the charts,” says Leslie Pekarek, a pre-K teacher at Gillett Elementary School in Wisconsin, who has used this method for the past four years. “When they are part of planning their play, they own it so much more. It feels like, it is, their idea.”

Adele Diamond, a developmental cognitive neuroscientist at the University of British Columbia, is one of several researchers who have studied the impact of the Tools approach. In a 2007 *Science* article, she and her co-authors compared 147 children, about five years old on average, who were from the same urban neighborhood and had teachers with the same resources and level of training. But one group of these kids had teachers who used

Tools, and the other group received a more traditional, literacy-oriented curriculum. After one year, the children in the Tools classrooms were testing better compared with the literacy group on tasks related to executive function. The program has since been redesigned to make it easier for teachers to use and customize. A 2014 study of the revamped version by Blair and C. Cybele Raver, also at N.Y.U., showed Tools children in 29 schools also gained skills in academics.

TALKING POINTS

THE CHILDREN using Tools or similar approaches are doing more than learning to plan and play roles. They are also developing language skills—the second set of foundational abilities highlighted by research. Teachers and parents notice these skills when frustrated children stop—or at least shorten—a tantrum and begin to “use their words.” The ability does not simply make adults’ lives easier. It also enables children to speak with and listen to peers in ways that help build friendships, and it gives them the ability to ask teachers and other adults questions about new content they see in books or videos. As children move into kindergarten and first grade, these language skills are linked to their ability to read and comprehend texts.

Sonia Q. Cabell, a literacy researcher at Florida State University, says it is critical to develop these skills early because they give rise to later, more sophisticated approaches to language and to learning. And after a slow start, she adds, it is hard to make up ground, and achievement gaps get wider: “The ones who are behind don’t tend to catch up.”

Insights about oral language and literacy are rooted in older studies on ways to help children learn to read. Starting in the late 1980s, studies showed that simply reading a picture book to a young child was not as effective as pausing to engage in “dialogic” reading. Interactive dialogue about the book helped children learn new words and follow the meaning of the stories. An oft-cited 2002 study showed that differences in the way a teacher talked in class—whether reading a book or not—could change how children in preschool learned language. In that study, which tested more than 300 kids from different socioeconomic backgrounds across Chicago, the children with teachers who spoke in complex sentences showed significant growth after one year in their own use of complex sentences. Those with teachers whose language was not as complex (less likely to use multiple clauses, for example) did not show the same growth.

Today the evidence continues to pile up: a higher quality and quantity of children’s turn-taking conversations helps them build their oral language skills, laying a foundation for reading and writing. For example, a study by Cabell and her colleagues, published this year in *Early Education and Development*, examined how teachers read books to 417 pre-K children in multiple locations around the U.S. It showed that what is called “extratextual” talk—moments when a teacher pauses to remark on the story and ask the children some informal questions about it—makes a big difference in children’s overall literacy and language skills. Some scientists are now applying these findings about teachers’ talking styles to experiments on how to help children with developmental delays.

Susan C. Levine, a professor of psychology at the University of Chicago, was one of the researchers who conducted the 2002 study of in-class language complexity. She also has been exploring how adults’ talk about math—whether by parents or teachers—

affects how children learn to handle numbers. For a 2006 study, she monitored hours of teacher-preschooler interactions. After a year, the more teachers used words associated with math—phrases such as “we share by dividing equally” and “all three of you can help me”—the higher the children scored on math tests.

Strategies to encourage more conversation are part of Tools of the Mind, too. Leong says the program was designed so children “talk to each other, and *then* the teacher calls on them. And by then they have had much more practice.” The kids are not only learning how to express themselves and use new vocabulary but also listening to each other: “It equalizes the classroom and creates a community of learners where kids value each other’s opinions,” she says.

To encourage this kind of conversation, teachers have to plan ahead and set up routines that provide a sense of order and fairness in the classroom. In her study of extratextual talk, Cabell and her colleagues discovered that it was only in highly organized reading sessions that conversation around the content of books appeared to affect how well children learned vocabulary. When classrooms were more chaotic, teachers were less likely to engage in conversation with children that stimulated their language development.

Regardless of the exact methods used, McClelland says, it is possible that many of these strategies for oral language and executive function work together and build on one another. Teachers who give kids opportunities to make choices can help to develop children’s executive function skills, which then helps them stay focused and keep their emotions under control. That in turn may aid children in figuring out math problems and lead them to try new words and complex sentences, which helps them learn to read and succeed in school. And all of that helps the kids feel less stressed and more able to regulate their behavior. The interwoven connections may also be what makes these skills so important throughout one’s lifetime. “All of this co-develops,” McClelland says.

LEVELING THE PLAYING FIELD

THE LIFELONG BENEFITS highlight just how unfortunate it is that the majority of low-income children do not have access to good preschool programs. A few states have rolled out free preschool for almost any resident who wants to enroll their children (Oklahoma, West Virginia and Washington, D.C., for example), but most states have more limited programs, and some states provide no preschool option at all. Head Start, which is aimed at families in poverty, children in foster care, homeless children and children with special needs, is currently accessible to only 31 percent of the eligible population, according to the National Head Start Association. The National Institute for Early Education Research at Rutgers University, which tracks teachers’ level of preparedness, as well as other indicators of quality in state-funded pre-K, found that just 9 percent of enrollees nationwide are in state programs with high marks on all or almost all indicators of quality.

This shortfall has long-term consequences. Research on educational outcomes for young children shows that the higher the quality of the program, the better children do by the end of high school and in their adult lives. A recent analysis of the effectiveness of 21 public pre-K programs, published this year by the nonprofit Learning Policy Institute, reported that high-quality programs “help close the gap in school and life outcomes between those raised in



INSTRUCTIONAL GAMES called Red Light, Purple Light, which include a dance activity, help kids learn to manage impulses and emotions.

low-income families and their wealthier peers.” These outcomes include a higher likelihood of graduating from high school and a lower likelihood of unemployment or spending time in jail.

Now there is evidence that a good preschool program may have effects that span generations. A new study by Nobel Prize-winning economist James J. Heckman of the University of Chicago and economist Ganesh Karapakula of Yale University tracked the effect of a Michigan program started in the 1960s known as the Perry Preschool Project. Perry used a curriculum called High-Scope that continues to be implemented in some preschools today and, as with Montessori and Tools of the Mind, puts a premium on executive function and language development. Heckman and Karapakula found that when the Perry children grew up and had kids of their own, those youngsters went further in school, had fewer discipline and legal troubles, and, for some, even had better health than children in a comparison group.

TEACHING TEACHER

THIS KIND OF QUALITY preschool experience, the research also indicates, requires a quality preschool teacher. The implication is that if governments ever follow through and invest more in pre-K and if Bezos’s preschool network comes into being, leaders will need to focus on training adults as much as teaching children. “These oral language and executive function skills have to be more explicitly part of the instruction in the classroom and not something that happens by accident,” University of Virginia’s Pianta says. “This is not just ‘let them play,’ nor is it ‘drill them on their letters.’”

Scientists highlighted this teaching effect in studies that began in the mid-2000s. They tracked hundreds of children in Chicago facilities that administer Head Start. Half of the children had teachers trained in ways of encouraging executive functions, and half had teachers who had not. Training included lessons on how to support children in managing their emotions and how to organize a classroom without being a dictator. By testing the children before and after their pre-K year, the researchers, led by

N.Y.U.’s Raver, found that the kids with trained teachers had better self-regulation and academic skills than those without. Ten years later researchers followed up with the children, now teenagers, to see whether the effects had lasted. The answer, published in 2018 in *PLOS ONE*, was yes. The students still had higher grades.

Other efforts to train teachers involve methods that prompt the adults to reflect on exactly what they are doing each day as they interact with children. Observers sit in the back of classrooms and take notes on a teacher’s ability to elaborate on children’s remarks while introducing new vocabulary, to redirect students’ attention when they become distracted, to recognize their individual needs, to respond thoughtfully to their questions or concerns, and more. The notes then get applied to one of several rating scales that score the classroom environment. One, now required in Head Start, is the Classroom Assessment Scoring System, developed by researchers at the University of Virginia. It measures interactions—including back-and-forth conversation—between teachers and children.

Coaching programs are also gaining traction as a way to give teachers support that is specific to the context of their classrooms. The coaches use data gathered from environment-rating scales and go into a classroom to physically demonstrate new techniques. “If the adult is scattered and doing 10 different things at once, that’s [likely] what the child will be doing,” says Elizabeth Slade, lead coach for the National Center on Montessori in the Public Sector. But when a teacher is focused on a child, one-on-one, Slade says, that teacher is showing “that this is what paying attention looks like.”

Perhaps that kind of behavior modeling is why the little girl with the pomegranate could work so diligently for so long. Earlier that morning her teacher had had several one-on-one conversations with other kids, letting the three-and-a-half-year-old work on the fruit by herself. By snack time, the girl had a full bowl of tasty, sweet seeds to offer to her classmates. She brought it over to a boy kneeling next to a shelf of blocks. “Pom-grat,” she said out loud, practicing the word, which she had just learned. “Do you like that?”

MORE TO EXPLORE

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