

Maryanne Wolf

Balance technology and deep reading to create biliterate children

Every child needs a repertoire of digital skills, but educators also must ensure that children develop the deep reading skills of an expert reader over time.

By Joan Richardson

KAPPAN: You've said that reading is essentially an unnatural process, that it's an acquired skill. It's not like seeing or speaking or tasting or anything like that. That made me wonder what really is reading? What do we mean when we say someone is learning to read?

MARYANNE WOLF: In contrast to oral language or vision or cognition, there is no genetic program for learning to read. You can put a child anywhere in the world in a speaking environment, and it will naturally trigger their language. It will happen. Not so with reading. Reading involves the acquisition of an entire symbolic code, which is both visual and verbal.

Reading reflects one of our human brain's most essential capacities that goes beyond any primate brain. Through reading, we take two independent functions, like vision and language, and we are able to connect them symbolically and make something new.

Pascal said there is nothing new under this earth, but there is rearrangement. That's really what the reading brain is. Reading embodies the ability of the brain to rearrange circuits that were not necessarily connected in any other way and connect them so that something new occurs.

Reading is both a symbolic act, but it's also an extraordinary act in terms of cerebral complexity and plasticity. Though it begins by connecting vision and language processes, it goes on to connect concepts, background knowledge, all the aspects of language

like syntax, semantics, and morphology. Over time, it adds inference, analogy, perspective taking. It adds so many cognitive skills that, by the end, the reading circuit involves a panoply of some of the most basic processes connected to some of the most sophisticated cognitive and linguistic processes that human beings have ever achieved. The outcome is an extraordinary range of processes that all come together to propel thought. This same plasticity, however, also means that developmentally it can begin very simply and remain simple, or it can steadily elaborate over time.

Thus, when we read, we begin by learning to decode print and to derive information from cracking this code and then over our life span learning to connect the act of reading to our most sophisticated comprehension processes.

Deep reading

KAPPAN: When you make the distinction between the novice reading brain and the expert reading brain, you're saying that the expert brain has developed the capacity to make inferences and engage in critical thinking?

WOLF: I place all of those comprehension processes under the rubric of deep reading. For me, expert reading involves everything from getting the information off the page to a reverse hierarchy of ever deeper skills, moving from adding background knowledge to inference and analogy, induction and deduction, perspective taking, and critical analysis.

JOAN RICHARDSON (jrichardson@pdkintl.org) is editor-in-chief of *Phi Delta Kappan* magazine.



*Maryanne Wolf focuses much of her work on how new forms of technology influence the development of deep reading.
(Kelvin Ma/Tufts University)*

Maryanne Wolf

Maryanne Wolf is the John DiBiaggio professor of citizenship and public service and director of the Center for Reading and Language Research at Tufts University, Medford, Mass. She is also the author of *Proust and the Squid: The Story and Science of the Reading Brain* (HarperCollins, 2007).

Wolf has spent years understanding how humans learn to read and what happens when that process breaks down. Through her research in the cognitive neurosciences and child development at the Center for Reading and Language Research, Wolf uses an understanding of the reading brain to create new methods to assess, tutor, and teach reading to children and individuals with reading disabilities. Her scholarship has resulted in new developments in treating dyslexia and has added to the body of knowledge in the neurosciences.

She developed the Tufts Literacy Corps, a large and highly effective community service learning program, and a summer school literacy program in Malden, Mass. She also stewards ongoing applied research projects in the Greater Boston area, an adult literacy intervention in Medford and in Pennsylvania, and an after-school literacy program in Phoenix, Ariz., for children who are English language learners.

As we go ever deeper into our own insights, we sometimes reach epiphanies beyond any information from the author. These insights are the basis for new thoughts that were not there before for us and, perhaps, for anyone else. In essence, we move during expert reading from the surface to the deepest levels of thought.

KAPPAN: In *Proust and the Squid* (HarperCollins, 2007), you describe the different neural pathways that are created in the brains of individuals who learn

When I read on a screen, I become more like the medium: I read for speed and immediacy.



to read using ideograms and those who learn to read in alphabetic systems. That's a really fascinating discovery. I wonder if you have also looked at the development of neural pathways for children who learn to read primarily using digital devices? Are those different from children who learn to read primarily through traditional print?

WOLF: This is one of the really big questions. One of the research projects that I most hope to do is to look at the physiological differences. We don't yet have what you're asking about, but it's what I want to ask too. This really begs to be done.

My hope is to compare children from, for example, Orthodox Jewish families and/or Amish families where technology is not part of their background, but where we can control for variables like social-economic status, intellectual capacity, parental education, and the like. I'd like to know if there are differences among children who are learning with all technology, children with a print and technology hybrid, and children with no technology.

Distracted digital reading

KAPPAN: When you talk about digital reading, I want to be clear which kinds of digital reading concern you. Are you talking about reading on devices, like a Kindle, which can be not much different from reading a printed book, or are you talking about reading mostly on the web or on devices that offer readers a lot of hyperlinks to audio files, video files, picture files, and the like?

WOLF: We've not seen the kind of differences that we are most worried about when a child is looking on a Kindle. I'm talking about a child using a digital device where there are obvious distractions.

There are definitely going to be differences with a child who's actually in a device in which their attention is constantly being elicited by the next stimulus.

Even though I believe there are important differences between the Kindle and Internet types of reading, we don't know if the way we read on screen is bleeding over into the Kindle. I feel that that is the case with me whether I'm reading on a Kindle or on the Internet. When I read on a screen, I become more like the medium: I read for speed and immediacy.

Thus children aren't necessarily on safe ground just because the Kindle-like screen doesn't have all the distractions found on their other digital devices. Most children are being introduced to digital devices that are veritable petri dishes for multiple distractions. So the question becomes whether the mindset formed in a digital cultural milieu is really programming children always to be expecting the next attrac-

tive stimulus, rather than focusing their attention and concentration.

What I do not know is whether children who are only reading on a Kindle format will be vastly different from the rest of the digital native children.

School use of technology

KAPPAN: Do you know of schools or districts that are primarily using digital devices to teach reading to the exclusion of print?

WOLF: No, I do not. But I'm sure there are people who are poised to do that. There are schools that have gotten rid of every book and digitized everything. They did this before we had a shred of evidence either way.

I look at that as a piece of a culture of lurch in the U.S. in which we go too quickly to whatever is the newest trend in education without sufficient evidence about what is best for whom and under what condition.

My whole perspective on using technology, however, is anything but binary. We live in a culture in which digital skills are absolutely part of the repertoire needed for every child. My question is how best to introduce technology in terms of reading acquisition, so I can be assured that children can develop deep reading skills over time.

I want children to look at reading in terms of how they personally contribute to what they learn. With a digital device, instead of their imaginative imaging, they just push a button and see a scene. I don't want that from the start. I want to evoke their own imagination, their own thought. We don't want to short circuit the development of these more sophisticated processes before they even begin.

Introducing technology

KAPPAN: What is the best way to introduce digital devices into a child's reading repertoire? Is there an age or a developmental stage where that's more advantageous than another?

WOLF: There are real differences in what optimizes the performance of children at different ages. You have digital natives who are looking at the screen all day and who assume they will actually comprehend better on the screen. But there is evidence that some comprehension skills are better, even for those digital natives, when something is printed out and where there is a mindset to slow down their thinking for a more thoughtful analysis of what they've read.

We've seen some preliminary data showing that children at 5th grade who, if you've got a really strong reader, are not showing as much of a difference between reading on a Kindle-like screen and a printed

book. But I'm not staking anything on anybody's evidence yet.

No one has answered what might happen developmentally if we were to introduce a little bit of technology in kindergarten, a little more in 1st grade, a little more in 2nd grade etc. For me, that's what I hypothetically theorize as the best way to do it, adding a little bit more at each interval.

What I would really want — and this is really pie-in-the-sky thinking — is some kind of mentoring sys-

Digital skills are absolutely part of the repertoire needed for every child. My question is how best to introduce technology in terms of reading acquisition, so I can be assured that children can develop deep reading skills over time.



I always want to have both technology and print available. I don't want to replace print with technology.



tem for children, to chart if they're developing these deeper inferential skills on their own at each stage of acquisition. That would help us know if this is a point where we can add more technology. Can we use technology or apps to elicit forms of deep reading?

That's one of the really important questions that our group is trying to address in a very unusual and rarefied situation in Africa where we are working with children who have no exposure to any technology, to any form of education, who would never go to school in their entire lifetimes. In that situation, I am trying to figure out with colleagues from MIT and Georgia State University whether we can create apps and curate apps for tablets that will help children learn to read on their own. In this context, we want to see if we can through technology help them develop inferential and analogical skills.

I wouldn't want to do that in the same way with children who have teachers. I look at technology as one of our great complements to teaching, not a replacement.

Emotions and reading

KAPPAN: When I think about how we all read to our children back in the day when we were reading just print books, we cuddled up with them on the

couch or on the bed. There was a very warm and close relationship with them. I wonder how integral that relationship is to learning to read and to learning to read deeply. How integrated is that emotional feeling with the acquisition of reading? What happens if you separate that emotional relationship with a caring adult from reading?

WOLF: One of the single best aspects of the earliest reading experience is this connection between affect — if you will, love — and the reading life. It's one of the most precious aspects of early childhood and early parenting. I worry that this is being threatened. So many parents simply do not read to their children because they believe they're doing their child a favor by providing this panoply of technological gadgets, especially in the first two or three years.

But we've seen data from Kathryn Hirsh-Pasek that children who are raised with all of these bells and whistles do not develop language as well as children who are learning language through human interactions (i.e., their parents!). Pediatricians are all over this. They now have guidelines in which they're actually asking parents to limit technology in the early years.

Little is more beautiful than having a parent and child reading together. Why would we ever want to lose that when we know how important it is socially

and emotionally and when it starts out a reading life in the best possible way? Bringing together the richness of a caretaker's love of reading and the caretaker's love of the child through the human voice, that's just a wonderful thing. Why would we ever want to replace that?

The more you read to your child, the more you talk to your child, the better the precursors of reading are acquired. This statement is just scratching the surface. There's also the content of the book, the vocabulary, grammatical development. Children who are being read to are acquiring all manner of things cognitively and linguistically. While I have great respect for colleagues who are developing interactive books, that's not the answer during the first five years.

Not always bad

KAPPAN: But there must come a point in reading development when having the richness of all of those tools becomes a benefit. The story about technology can't be all bad.

WOLF: Not at all! By and large, by 4th and 5th grade, if all has gone well — and keep in mind that 30% to 37% of American kids are not fluent by 4th grade — children have learned how to be fluent enough in their reading to become connected to the comprehension processes that make up the expert reading brain circuit.

At this juncture, all of this richness of technology can play an evermore important role. I always want to have both technology and print available. I don't want to replace print with technology.

Until I am convinced by research to the contrary, I am convinced that what we need is to build a carefully considered trajectory for the development of a truly *biliterate* child who knows what is best for different kinds of reading for them.

Just like you and me, we can turn to books. We can print out things when we need slower attention. It's ultimately all about the quality of attention. We want the best forms of attention for our children over time. You and I don't need deep reading for most of our email. But we do want it for whatever requires our best thought.

I'm both very positive about the uses of technology and very cautious about lurching without a thoughtful approach to the development of these skills.

Adult readers

KAPPAN: As we were preparing for this, *Kappan* Managing Editor Greg Patterson and I were comparing notes about the screen fatigue that we feel after sitting in front of a computer screen all day long, reading and spending a lot of time on the Internet. Of course, we're still reading for pleasure and, for

both of us, we're inclined to listen to books now rather than read books for pleasure. Is that a natural response to the cacophony of the Internet?

WOLF: Knowing what I know, you'd think that I'd be vigilant about my own reading! I have been very concerned for other adults that their on-screen reading habits might be bleeding over into their off-screen reading. I never thought I would be affected by what is basically a reading style meant for speed and rapid consumption.

I tested myself by going back to one of my favorite novels, *The Glass Bead Game* by Hermann Hesse. It's a beautiful book. Well, basically, I couldn't read it. It was the equivalent of visual molasses. It was so stultifying. The prose style was prohibitive. The concepts were abstruse. It was paralyzing my "normal style" of reading. I was so frustrated that I just put it aside. And then I realized the painful truth: I'm just like everybody else. I've changed totally. I'm not patient. I was not willing to slow myself down enough to appreciate the beautiful differences in Hesse's early 20th-century style.

Just like everyone else, I had become the online reader and hadn't known it. But, if I hadn't known this was happening — and this is my turf! — I dare say so many of us have changed our reading skills without realizing it.

For me, it was an incredibly important experience. There's a happy ending. I forced myself to go back and read just 20 minutes a day. It took me two full weeks, and then I was back. But it took discipline and motivation to return to my former reading life and former reading style.

How do we not lose this? How do we preserve the expert reading brain of the past, as we in our daily lives become this 10-hour on-screen reader? I do not want us to lose that extraordinary circuitry that was so useful to us.

Restricting technology

KAPPAN: There was a story in the *New York Times* recently about the restrictions that Steve Jobs and other tech leaders impose on their own children's use of digital devices. The headline was "Steve Jobs was a low-tech parent."

WOLF: When I wrote *Proust and the Squid*, I received confidential letters from Silicon Valley executives saying "we are worried about our kids, and we are not allowing our own children to use too much technology." It was a fascinating form of disclosure.

And here is one of my own. I have two adult children who are absolutely both completely immersed in technology. The irony of irony is that one of my sons just graduated from Tufts, and his first job is at Google. You just have to laugh. Irony is everywhere! 

I look at technology as one of our great complements to teaching, not a replacement.