Toddlers and Tablets

Emerging apps take cues from learning science

by ALEX HERNANDEZ

The first iPad was released in April 2010. Three years later, a Pew Internet survey found that half of American parents with children at home own a tablet computer. Mosey on over to the iTunes app store, and 9 of the top 10 paid education apps are designed for small children, ages four and up.

To summarize: families with means are loading up on tablets, and they are buying education apps targeted at preschoolers.

I believe four-year-olds will shape the future of education technology (edtech), long before they ever set foot in a kindergarten classroom. And when I say four-year-olds, I'm just being politically correct. Two- and three-year-olds will get in on the action, too.

Made for Little Fingers

Touchscreens are the most intuitive interfaces ever created for small children. I still remember the weekend morning in 2008 when our 18-month-old padded into our bedroom, grabbed his mom's new iPhone off the nightstand, turned on his favorite song, and began pawing through photos. My wife and I looked on in abject horror, each accusing the other of secretly using the iPhone as an electronic babysitter. Horror morphed into guilt but later turned to awe. No one had to teach our toddler how to use a touchscreen.

Leading app developer Duck Duck Moose believed it was designing for four- and five-year-olds when it noticed two-year-olds using its math apps. Dragonbox, an algebra program for children eight and up was being used by five- and six-year-olds. No one informed these kids that they weren't ready for higher-level math.

Children do incredible things when they are free to explore and learn.

Duck Duck Moose co-founder Caroline Hu Flexer observes that young children are demanding more-sophisticated, higher-quality education apps as they become accustomed to gaming apps made for adults, such as Angry Birds.

But parents are still not fully sold on kids and tablets. According to the Parenting in the Age of Digital Technology survey, only 37 percent of parents who own a mobile device say they would offer it to their children to keep them busy.

Seventy-eight percent would allow their kids to watch TV for the same purpose. My hypothesis: tablet computers are considered luxury goods that are purchased for adults, not kids. The prospect of putting a $600 device in the grubby hands of a three-year-old is still not all that appealing.

As tablets become cheaper and more ubiquitous, children will gain greater access at home.

Learn at Home

Fairly or not, educators criticize edtech companies for producing uninspired products that ignore learning science and yield meager results. School officials can exacerbate such problems through bureaucratic, irrational purchasing and poor program implementation.

Early-childhood app companies have a chance to break through this logjam and lead the entire sector forward. Many developers are bypassing schools altogether and going directly to families. By removing the layers between the people making the apps and the children using the apps, developers can respond more quickly to user behavior and make better products faster. They can also experiment with new approaches to learning without having to fight through the institutional inertia of "this is how it's always been done" or "that will never work."

For example, Minecraft is a sandbox game that allows children to flex their creative muscles by building anything they can imagine. Think Sim City crossed with Legos. While educators continue to debate whether Minecraft should be used in schools to promote creativity, the app has been downloaded 20 million times at home, captivating an entire generation of children. Innovations will continue to emerge in the space between unstructured, informal learning and structured, formal learning and, like Minecraft, blur the line separating the two.

To prevail in the home market, developers must create high-quality apps that enhance the childhood experience. In order to be fully embraced by families, technology can't crowd out bedtime reading, make-believe play, or digging in the mud; it must be additive. The pressure to create meaningful, worthwhile experiences will push the best developers to think innovatively about new apps.

App creators must also think holistically about early-childhood development. Only a fraction of essential early childhood skills, like learning to categorize objects or recognizing letter sounds, lend themselves to explicit academic preparation. Yet research suggests that children's ability to pay attention and control their impulses (i.e., executive functions) are better predictors of future academic success than IQ. Children's ability to manage their attention, emotions, and behaviors; learn appropriate ways to interact with others; and be creative are equally, if not more, important but often harder to target than pre-academic skills.

But not impossible. App maker Kidaptive recently released a turn-taking game in which children paint pictures alongside two animated characters. Children using the app must literally sit and wait for the animated characters to complete their turns before resuming their own painting (defying many conventions of good game design). The metrics don't lie. Kids are being patient and taking turns.

It's no surprise that Kidaptive employs five learning scientists on its 20-person team and its advisory board is anchored by two Stanford education professors.

Apps of the Future

I predict that the best new apps will push the boundaries of early childhood development and learning science in at least four areas:

Executive Function: Leading childhood development researchers Michael Posner and Adele Diamond believe that executive function in children can be improved through intentional, repeated practice, and they have effectively used computer games to strengthen executive function in kids. App developers will build on this pioneering work. Once adults grasp how much children stand to benefit from improving focus and self-control, expect to see a flood of new apps.

Creativity: Parents of young children highly value creativity and view it as their job to provide such opportunities outside of school. Minecraft, Toca Builders, Sago Mini Bug Builder, and DIY.org represent the latest wave of creativity apps whose open-ended structures have captured the imaginations of millions of children.

Number Sense: Children's brains are wired for number sense, and strong early number sense builds mathematical confidence and solves a host of academic problems down the road. The work of DreamBox Learning and ST Math demonstrates that young children can develop deep conceptual understanding of mathematics using virtual manipulatives.

Phonemic Awareness: Early communication skills are deeply rooted in talk between children and trusted adults.

And physical books are still superior to e-books in promoting the shared reading experiences that are so critical to early literacy. I suspect both of these activities are better off without technology for the foreseeable future. However, identifying and manipulating letter sounds, learning phonics, and completing other word work will naturally drift to tablets. Endless Alphabet is introducing two- and three-year-olds to their ABCs, and Learn with Homer recently debuted the first comprehensive reading app.

Then you have computer programming app Hopscotch, which weaves number sense, executive function, and creativity skills together all at once. Expect to see developers build apps that combine different permutations of essential early-childhood skills.

Kids and Tablets. Yay! (I Think)

Me: Time to put the iPad away... The show is about to start. Seven-year-old son: BUT DAD! I'm spelling! [exasperated, extra dramatic noise]

Me: [pause] Uh. [longer pause while watching him play spelling game] Just a few more, I guess.

Surely the National Association for the Education of Young Children (NAEYC) can set the record straight on how technology harms young children. NAEYC's shocking and courageous verdict (after a long list of caveats): "When used appropriately, technology and media can enhance children's [ages 0 to 8] cognitive and social abilities."

Dr. Alison Gopnik, professor of psychology at the University of California, Berkeley, acknowledges that learning to use technology at an early age will have an impact on child development, just as learning to read rewires our brains. It's just too early to know what kind of impact. The technology is so new that there can't be any empirical evidence. Like so many things in life, parents will have to use their best judgment.

So while the media hyperventilate about MOOCs and higher education, and K–12 school districts around the country form technology committees, the nation's preschoolers have the situation well in hand. Hold onto your sippy cup.

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Note: *The Charter School Growth Fund, a nonprofit, has a mission-related equity investment in Dreambox Learning. Alex Hernandez is an unpaid advisor to Homer Learning.*