

EDUCATION MATTERS

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By Raya Bidshahri

How Technology Is Transforming the Way We Teach and Learn

Our education system is in need of reform. Most students are not taught to be self-motivated, lifelong learners, nor do they come out of the school system with the skills, mindsets, and values required to survive in a world of accelerating change. Most students do not graduate to feeling inspired to contribute to human progress.

Traditional school curricula have mostly gone unchanged for centuries, and there is a lack of scientific basis in pedagogy. There continues to be an emphasis on short-term grades and individual achievement.

How can we effectively educate future generations? What do we need to change about mainstream education? The answer to these questions does not entail small incremental changes but rather a complete overhaul of mainstream education as it exists today. It also requires changing how we define education to begin with.



Technology is already transforming the way we teach and learn. Digital classrooms, global online collaborations, and personalized learning are just the beginning. What will these technological trends in EdTech lead to? What will the word “education” even mean thirty years from now?

Ten years ago, the Millennium Project set out to explore this radical future of education and released a groundbreaking report called “Education 2030.” Ever since, we have been seeing their predictions, concerns, and solutions begin to come to life. Here are just some of the highlights.

Integrated Lifelong Learning Systems

Education should not be something that you do at a specific institution for a specific period of time for a certification. Instead, it should be a lifelong journey of exploration, self-discovery, and liberation driven by intrinsic rewards. Effective education needs to be integrated into our everyday experiences, including entertainment. According to the “Education 2030” report, future education will be tailored to users “across all age groups from pre-natal programs to programs for the elderly that provide knowledge, work, and leisure enjoyment.”

A lifelong learning mindset is essential to be employable in the future work force. A report by the World Economic Forum revealed that almost 65 percent of the jobs elementary school students will be doing in the future do not even exist yet. New industries are consistently being born and dying out through disruption. Future workers need to be able to leverage online MOOCs and the vast array of educational resources available to them to gain on-demand skills.

“These immersive experiences have the potential to contribute to faster learning, better retention, and improved decision-making.”

It’s tragic how very few curricula focus on teaching young minds how to learn and unlearn effectively. In the postindustrial era, the impact of technology has meant we have to be agile and adaptive to unpredictable consequences of disruption. We may have to learn skills and mindsets on demand and set aside ones that are no longer required throughout our lives.

There’s more. These integrated lifelong learning systems could also be critical in tackling the many sources of unhappiness and mental health issues seen in society today. As pointed out by the “Education 2030” report, continuous evaluation of individual learning processes can be designed to prevent people from becoming unhappy, and “programs aimed at eliminating prejudice and hate could bring about a more beautiful, loving world.”

Immersive Learning Experiences

Virtual and augmented reality are revolutionizing the learning experience. They allow students to take journeys into ancient history, travel across the universe, and visit museums in different countries, all without leaving the classroom. One of the biggest feats of such technologies is that they make the learning experience more engaging, awe-inspiring and transformative. They allow us to shift mindsets and send powerful messages through immersive experiences.

For instance, the Google Expeditions Pioneer Program will allow

teachers to take their students on a journey anywhere in the world. Whether it’s “exploring coral reefs or the surface of Mars in an afternoon,” teachers can take students on immersive virtual field trips. Could this be the beginning of an entirely virtual school?

These immersive experiences have the potential to contribute to faster learning, better retention, and improved decision-making. It is important to note the curricula integrated with the technology are just as important as the technology itself. There is no point digitizing already flawed curricula. Simply implementing virtual reality is not enough—the content and curricula implemented into this technology need to be innovative. The virtual journeys we take students on will need to be based on the relevant skills, values, and mindsets that we want to instill in future generations.

Cognitive Enhancement: Improving Intelligence

Education is increasingly being treated like a science. We are seeing the rise of neuroeducation, wherein scientists are gaining a better understanding of the mind, brain, and the learning process. These developments in understanding how our minds operate can have powerful implications on our learning capacities. Many educators are being encouraged to use these findings to adapt to how they teach.

Some experts even hope for a complete mapping of human synapses to discover how learning occurs and



thereby develop biological strategies for improvement of learning. Understanding these mechanisms also paves the way for a wave of cognitive enhancement drugs, genetically enhanced intelligence, and integration with AI devices through brain-machine interfaces.

It sounds like science fiction, but it's already beginning to take effect.

Earlier this year, the first study to show significant cognitive improvements for cognitive enhancement drugs modafinil and methylphenidate in chess, was published in the peer-reviewed journal *European Neuropsychopharmacology*. In addition, a team of experts from Italy have set up a plan for an e-learning platform that operates on a brain-computer interface, called BRAVO, to customize the educational experience according to users' reactions and preferences.

While BRAVO is currently running on EEG headsets, such

technology has the potential to be directly integrated with artificial neural networks embedded in our brains. The implications of this are profound. Imagine being able to download an entire field's worth of knowledge directly into your mind. Imagine being able to directly upload your thoughts and ideas onto the internet. Imagine rewiring your brain on demand. What will education mean in this context?

Education as a Tool for Civilization-Level Change

Extending this new definition of education, we must also begin to see education as a tool not just for self-improvement but also for driving civilization-level change. Expert Marc Prensky, who actively promotes "civilization-level change" in global education, points out that most of us have an outdated perspective about what an education means and what it serves to do. We need to use it as a tool to inspire

and empower young minds with the necessary tools to contribute to human progress.

The technological tools outlined in this article can be powerful, and it's important to recognize that they can be used to either better or worsen society. One of the biggest issues in education, which will only be amplified as these new capabilities emerge, is the lack of universal access. The "Education 2030" report points out that governmental bodies should develop ways to encourage democratic and fair usage of these new technologies without letting their abuse by the few disadvantage the many.

Even worse, many political bodies will view these new educational capacities as a threat to their power. In fact, some of these techniques will be outlawed to perpetuate existing regimes, ideologies, and belief structures in various places around the world.

"Our civilization is now in the process of changing," says Prensky. "Those places in the world that take quick and appropriate action towards implementing a new educational paradigm will be the ones where children prosper and flourish in the future." And the places that don't will fall behind on the path to human progress. ■

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rational way. Raya is interested in the ethical and existential implications of exponential technologies on society.

Becky Mitchell, Idaho Teacher of the Year 2018

AAE and Northwest Professional Educators (NWPE) congratulate Becky Mitchell, Idaho's new Teacher of the Year. Not only is Mrs. Mitchell an excellent high school English and physical sciences teacher at Vision Charter School, but she is also a member of AAE's regional chapter in Idaho, NWPE. Her depth of experience, which spans a couple decades in the classroom, includes teaching everything from Spanish to kindergartners to chemistry at the community college.

Idaho Superintendent of Public Instruction Sherri Ybarra notes in her press release about Mrs. Mitchell's award, "Educators are in the business of human elevation, and Mrs. Mitchell demonstrates that every day.... In her years at Vision, she has immersed herself in teaching dual-credit classes, where her high school students earn college credits in courses ranging from chemistry, physics and engineering to English composition."

Intensely interested in helping her students receive higher education, Mrs. Mitchell noted in her application, "I would like to be the spokesperson for 'going on,' for encouraging this generation to jump with their parachutes and grab the future."

This fits with the character of Vision Charter School where 41 percent of seniors are on track to graduate with one or more associates degrees from the College of Western Idaho three weeks before they graduate from high school!



2018 Idaho Teacher of the Year and NWPE member Becky Mitchell (right) with Idaho Superintendent of Public Instruction Sherri Ybarra

Mrs. Wendy Oldenkamp, Vision Charter School administrator, characterizes Mrs. Mitchell as a masterful teacher who has "implemented a challenging blend of new online learning platforms into her classroom instruction and created a classroom environment where dynamic differentiation is the norm." She "has a long track record of bringing English to life for her students, cultivating lovers of literature, the classics, and drama. Her students are drawn in by her flair and personality, but quickly catch her contagious love of learning."

Mrs. Mitchell serves as Vision Charter School's English Language Arts department chair and Lead Teacher for Secondary Education. Her education includes a Bachelor in Chemistry Education and English Education degree, and a Master

in Science Education degree. Her science students have competed at Imagine Tomorrow at Washington State University winning awards in two different categories.

Mrs. Mitchell initiated the school's robotics program, which has grown into FIRST® LEGO® League and two FIRST Tech Challenge teams. In addition to her exemplary teaching and leadership at Vision Charter School, Mrs. Mitchell also serves as a teacher mentor for the Idaho Science and Aerospace Scholars Program, guiding teams through their summer academy at Boise State University and NASA Ames Research Center.

As Vision Charter School's drama director, Mrs. Mitchell added a broadcasting class with funds she won from Northwest Profes-

sional Educators' Classroom Grant Program. Mrs. Mitchell believes that the professionalism of educators will be enhanced if students take charge of their own education through creative endeavors like the broadcasting project.

Mrs. Mitchell has won the admiration of students and parents alike. One parent characterizes her as the "crowning jewel" of the school, saying, "If she can dream it, her students achieve it!" Students often consider Mrs. Mitchell a second mom and deeply appreciate her caring as well as her high expectations. They sum up well why she won this tre-

mendous honor. "There are plenty of good teachers in this world: teachers who are good at what subject they teach and those who have the ability to connect with students through learning. There are teachers that are very nice and caring, and there are teachers that earn the trust of their students. However, it is very rare that you find a teacher who possesses all these traits. Mrs. Mitchell has become a second mom to all of us, and we will always love her for what she has taught us about English, but especially what she has taught us about life."

Another student gushes, "Mrs.

Mitchell has made a huge impact on my life, and I wouldn't be on the path of education that I am currently on if it wasn't for her motivation and support. I firmly believe that no other teacher, besides Mrs. Mitchell, comes even close to receiving this award."

Congratulations, Becky! ■



Cindy Omlin is the executive director for Northwest Professional Educators, AAE's regional chapter in Idaho, Washington, and Oregon.

We Need to Change the Teacher vs. Technology Narrative

A recent chart from Bloomberg on the future of artificial intelligence and employment lends evidence to a point I have been making for years: teachers will not be replaced by machines. The chart compares a wide array of professions based on required education levels, average annual wages, and likelihood of automation. Sure enough, elementary and secondary teachers are among the most educated yet least paid professionals; and their likelihood of automation: practically zero. Yet the debate about machines replacing teachers rages on. Recent opinion pieces claim that teacher obsolescence is inevitable and something we should embrace. Fortunately, a recent article in the *Economist* gets the narrative right, pointing out that "the potential for edtech will be realized only if teachers embrace it."

Research consistently shows that teachers are the most important school-level factor affecting student outcomes—and good teaching goes well beyond presenting information or grading assessments with discrete answers. However, for teachers, the mountain of academic and nonacademic tasks they must tackle each day often leaves them feeling like they can't serve all of their students. Fortunately, the future of learning technology is not replacing teachers but amplifying their ability to



meet the learning needs of their students. My hope—and the focus of my recent paper on this topic—is to shift the narrative of "teachers vs. machines" toward a more productive conversation. We need to start talking more about the best ways to integrate technology and teaching to amplify teachers' impact.

Along those lines, here are two areas in which technology can amplify teaching.



Reallocating teachers' scarcest asset: time

Teachers have an ever-increasing list of tasks they must complete each day that often require them to stay late at school or take their work home. Fortunately, technology is increasingly able to do some of these tasks, such as take attendance, administer and grade assessments, deliver basic instruction, streamline lesson planning, and track student progress. By offloading these tasks to technologies such as MasteryConnect, Khan Academy, and Gooru, educators should be able to focus on the aspects of teaching that have the greatest impact on students: providing mentorship and guidance, offering expert feedback on student work that cannot be graded by machines, and engaging students in critical and analytical thinking.

Targeting students' individual learning needs

Traditional teaching constrains teachers to one-size-fits-all lessons and pacing that make it hard to meet students' individual needs. As a result, some students fall behind as the class moves forward without them, while other students finish all their work and become bored and disengaged as they wait for everyone else to catch up. Fortunately, technology offers a new alternative to the traditional model. Software can help teachers gather student learning data, analyze that data to pinpoint the daily strengths and struggles of each student, and then deploy various online, teacher-led, independent, and peer-to-peer learning experiences to target students' idiosyncratic learning needs. When implemented correctly, teachers and software work in tandem to support student learning.

Teachers are indispensable to high-quality education. They give students expert feedback on how to reason, design, compose, and find creative solutions to problems. They create classroom cultures where academic inquiry is exciting and achievement is a shared ambition. They provide students with social and emotional support and coach them on managing both their daily tasks and their long-term dreams. These are roles that machines are unlikely to substitute for anytime soon. Nonetheless, teachers need technology to help them meet the demands that stretch them to the limits of their human capacity.

Technology can do a great deal to support high-quality teaching. However, we still have a way to go before technology significantly amplifies the impact of great teachers. The most important work in edtech over the next five to ten years will be figuring out how to design technology and redesign teaching so that technology and teaching become seamless complements in the work of serving students. ■

This article was originally published by the Christensen Institute on August 10, 2017.



Thomas Arnett's research focuses on the changing roles of teachers in blended-learning environments and other innovative educational models. He also examines how teacher education and professional development are shifting to support the evolving needs of teachers and school systems.

AAE's Legal Corner:

Suspended with Pay Pending Investigation

It's a nondescript Tuesday afternoon and you are asked by your administration to "stop by" after school. Thinking nothing of it, you do and are stunned to be handed a notice that you are suspended with pay pending investigation. Your first reaction is normal and predictable: you question what you are being accused of and immediately begin to defend yourself. Your administrator acts like he/she can't hear you and you are sent home where you sit and wait, jumping each time the phone rings, hoping for answers.

The scenario sounds awful, and it is. It is not, however, necessarily the end of your teaching career. If you've been in this profession any length of time at all you have learned that students and parents make all sorts of allegations, many of which are unfounded or a result of misunderstandings.

Just because you have not done what you are being accused of does not mean your administration will ignore the complaint. You might be surprised to learn that in many situations your administration and/or the district are legally obligated to begin an immediate investigation. Oftentimes a district has to

investigate as part of provisions within an insurance policy and at other times the law requires a district to act promptly to certain types of complaints.

As overwhelming and unfair as it seems, part of an investigation requires that you be placed on leave and removed from the school until the conclusion of the investigation. To fully comply with legal obligations, you cannot be allowed to interact or stay in contact with any potential witnesses, the complainant(s), or anyone else who might be considered a witness or pertinent to the investigation.

While it feels like you are being punished for something you didn't do (and rightly so), that in actuality is not the case. Placing you on leave with pay ensures that you are not being harmed financially.

Usually you will be notified when the investigation is concluded and allowed to return to work. You must take no action against any person who complained or any witness that could be viewed as retaliatory.

There is little you can do to avoid complaints made by students, parents, or third parties. Anyone can

"Oftentimes a district has to investigate as part of provisions within an insurance policy and at other times the law requires a district to act promptly to certain types of complaints."



make a complaint for any reason. You can, however, work smart. Document difficult student interactions. Keep your administration in the loop at all times. Avoid any interaction with students that could be viewed in a questionable light. Always have an objective basis for awarding grades and remain professional in all your communications.

A suspension and the concurrent investigation are admittedly difficult. Your pride and sense of dignity will take a bruising. Unfortunately it is a situation experienced by too many of today's teachers. You are not alone. If you find yourself in a situation where you are served with a "Notice of Suspension Pending Investigation," please contact AAE Legal Services or your state chapter staff immediately to further discuss your options. We are here to help. ■



Sharon Nelson is the director of legal services for the Association of American Educators. In this capacity, Ms. Nelson oversees AAE's extensive legal teams across the country and

works daily with members and panel counsel to address member legal concerns. A passionate advocate for educators, Ms. Nelson has been a lawyer focusing on employee rights issues for nearly 20 years.

Ready for Kindergarten? Here Are the Apps That Can Help Make the Difference

A Mississippi teacher explains how the right kind of screen time can support future reading success

Phonological awareness is an essential part of oral language development. It includes identifying and using words and syllables. In an earlier opinion article for *The Hechinger Report*, I discussed how children with these skills have a much easier time in learning to read and spell.

Although these skills can be developed in preschool age children by simply reading books, teaching rhymes, and singing songs, technology can also aid in their development.

That's why I tell the parents and caregivers of children in my Mississippi kindergarten classes that instead of simply allowing children to spend screen time playing games without any educational value, they can access inexpensive—and even free—apps that will develop skills to lay the foundation for future reading success.

One app that fits the bill is [iSpy Phonics](#) (\$2.99). Children match sounds with letters using illustrations of everyday objects. Young learners become even more engaged when they have the opportunity to add their own voices and pictures. After looking around in the environment for things that begin with a particular letter, children can take a photo and say the name of the object to further reinforce the



sound they have learned. This app truly takes the familiar game of “I Spy” to the next level.

Because it features a Baby Mode that will automatically turn the pages, even toddlers can use [Interactive Alphabet ABC's](#) (\$2.99). Older children can interact with familiar objects that begin with each letter on a flashcard. Simply touching the screen will allow them to do things like take a bite from an apple or feed olives to an ogre. Next, they can sing alphabet songs, type words, or trace uppercase and lowercase letters. This app can also be customized when children take pictures of family

members or things in their home and add them to the sound library. With colorful artwork and playful animation, this app will be a fast favorite for any child.

[First Words Deluxe](#) (\$4.99) gives children age 5 and under the opportunity to build words in kid-friendly categories like animals, colors, shapes, and vehicles. It can even be customized to include other languages such as Spanish, French, German, and Japanese. Parents can choose levels of difficulty to match their child's abilities. It makes combining sounds to spell words fun and easy.

In *The Importance of Digital Storytelling for Children*, the author, Lucy Gill, says she understands how some parents could be concerned about excessive screen-time for young children. She admits that encouraging children to communicate with technology rather than in person could have negative consequences; however, she supports the use of digital storytelling because of the opportunities it offers to children.

Because this simply involves using something digital when telling a story, it brings together language and literacy skills while building a child's confidence and creativity. It also mirrors the traditional writing process because children are given the chance to brainstorm, create, edit, publish, and reflect.

To give children some very basic storytelling experience, parents and caregivers can use a free app called [ChatterPix Kids](#). Because it makes anything talk, kids simply need to take pictures, draw a digital line to make a mouth, then record their voices. Filters and stickers make this very similar to snapchat but it's safe for children to use. It provides them with a fun and easy way to express their ideas and share them with others.

Some other free digital storytelling apps I discovered recently provide young children with opportunities to retell familiar stories or make up stories of their own.



Devin Walsh is a kindergarten to first-grade "looping" teacher at Oak Grove Primary School in Hattiesburg, Mississippi. She recently completed a biennial loop with a group of first graders and joins a group of incoming kindergartners this fall, which also marks her 18th year of teaching.

The first is called [Princess Fairy Tale Maker](#). It allows users to create fairy tales with princesses, fairies, animals, and more and then decorate with sparkles and glitter. The oral language skills come into play when the child narrates the story using the self-record feature. Children will be proud to share their stories with family members and friends and will be encouraged when they feel their voices are being heard.

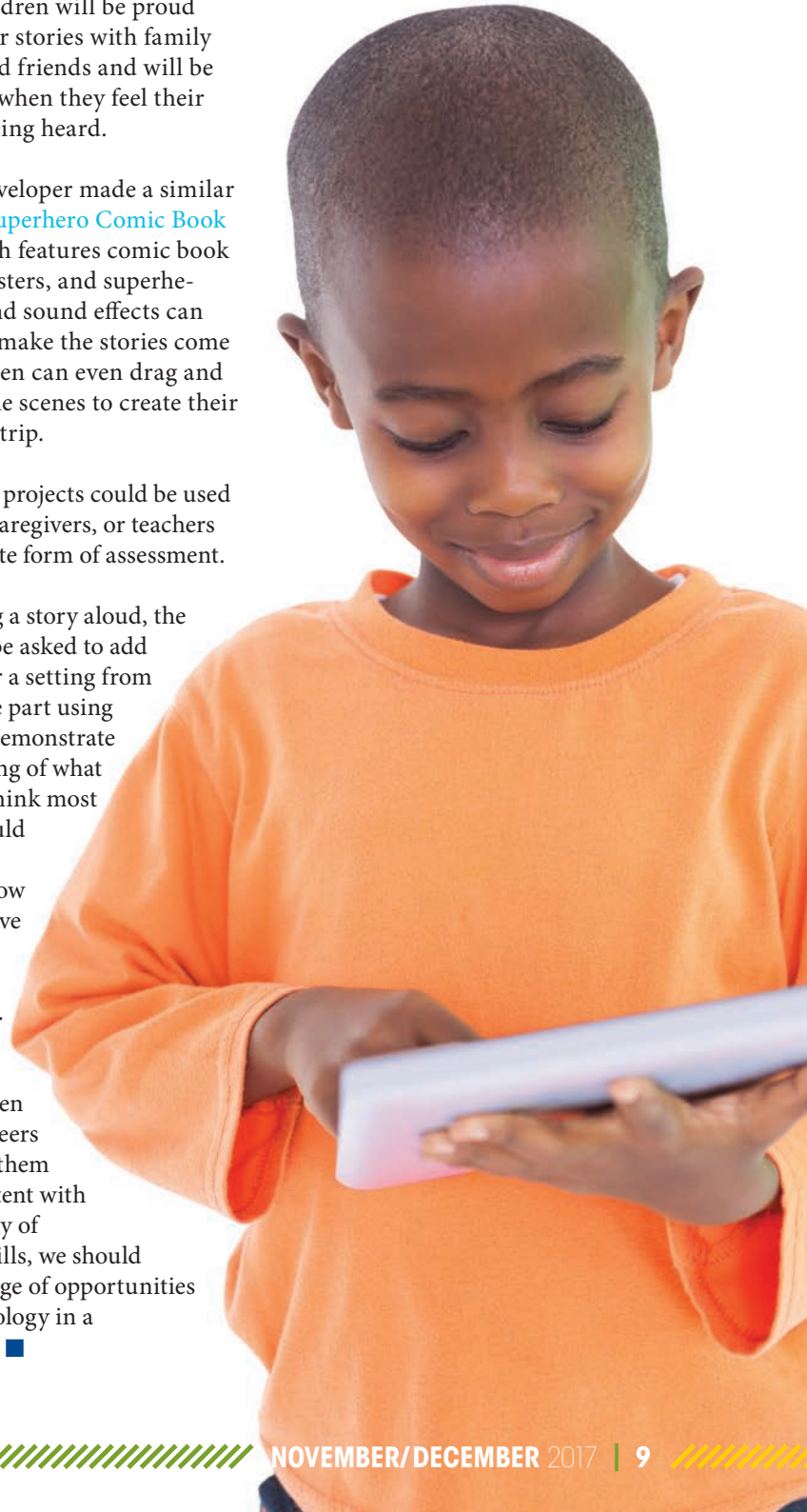
The same developer made a similar app called [Superhero Comic Book Maker](#), which features comic book scenes, monsters, and superheroes. Text and sound effects can be added to make the stories come alive. Children can even drag and drop multiple scenes to create their own comic strip.

These digital projects could be used by parents, caregivers, or teachers as an alternate form of assessment.

After reading a story aloud, the child could be asked to add characters or a setting from their favorite part using the apps to demonstrate understanding of what was read. I think most students would welcome the chance to show what they have learned in a new and different way.

Since many of our children will have careers that require them to be competent with a wide variety of computer skills, we should take advantage of opportunities to use technology in a positive way. ■

This story was produced by The Hechinger Report, a nonprofit, independent news organization focused on inequality and innovation in education. It was published on their website on August 7, 2017.





Three Reasons Most Teachers Still Believe the Learning Styles Myth

I concluded that many teachers believe learning styles theory is accurate in about 2003. It was perhaps the second or third time I had given a public talk to teachers. I mentioned it in passing as an example of a theory that sounds plausible but is wrong, and I felt an immediate change in the air. Several people said “Wait, what? Can you please back up a slide?”

Since then I’ve written a couple of articles about learning styles, created a video on the subject, and put an FAQ on my website. Last week I was on NPR’s Science Friday radio program (with Kelly Macdonald and Lauren McGrath) to talk about learning styles and other neuromyths.

I put energy into dispelling the learning styles myth because I thought that audience of educators was representative—that is, that most teachers think the theory is right. However, with the exception of one recent study showing that

academics often invoke learning styles theory in professional journal articles, there haven’t been empirical data on how widespread this belief is in the United States.

Now there are.

Macdonald, McGrath, and their colleagues conducted a survey to test the pervasiveness of various beliefs about learning among a sample of 3,048 American adults and 598 educators. Similar surveys have been conducted in parts of Europe, East Asia, and Latin American, where researchers have observed high levels of inaccurate beliefs on these issues.

Learning styles theory was endorsed by 93 percent of the public and 76 percent of educators. Data regarding other neuromyths (common misperceptions about learning or the brain) are shown in the table on the next page (from the paper).

As the authors acknowledge, there

are limitations to the interpretation, in particular regarding the sample. The subjects were visitors to the site TestMyBrain.org, and so it’s difficult to know how they differed from a random sample. Still, neuromyths were endorsed at rates similar to those observed in other countries.

Why is acceptance of the idea so high? No one really knows, but here’s my tripartite guess.

First, I think by this point it’s achieved the status of one of those ideas that “they” have figured out. People believe it for the same reason I believe in the atomic theory. I’ve never seen the scientific papers supporting it (and wouldn’t understand them if I had), but everyone believes the theory and my teachers taught it to me, so why would I doubt that it’s right?

Second, I think learning styles theory is widely accepted because the idea is so appealing. It would be so nice if it *were* true. It predicts

TABLE 5 | Neuromyth endorsement by group.

Neuromyth factor 1 items (ranked by % incorrect)	Correct answer	General public (N = 3,045) (%)	Educator (N = 598) (%)
14. Individuals learn better when they receive information in their preferred learning style	FALSE	93 ^a	76 ^b
26. Children have learning styles that are dominated by particular senses	FALSE	88 ^a	71 ^b
17. A common sign of dyslexia is seeing letters backwards	FALSE	76 ^a	59 ^b
32. Listening to classical music increases children's reasoning ability	FALSE	59 ^a	55 ^{ab}
22. Children are less attentive after consuming sugary drinks and/or snacks	FALSE	59 ^a	50 ^{ab}
8. Some of us are "left-brained" and some are "right-brained," and this helps explain differences in learning	FALSE	64 ^a	49 ^b
6. We only use 10% of our brain	FALSE	36 ^a	33 ^a
Average percentage incorrect on neuromyths factor		68 ^a	56 ^b

^{ab} Values with different superscripts are significantly different, $p < 0.001$ after covarying for age, gender, and education.

that a struggling student would find much school work easier if we made a relatively minor change to lesson plans—make sure the auditory learners are listening, the visual learners are watching, and so on.

Third, something quite close to the theory is not only right but also *obvious*. The style distinctions (visual versus auditory; verbal versus visual) often correspond to real differences in ability. Some people are better with words, some with space, and so on. The (incorrect) twist that learning styles theory adds is to suggest that everyone can reach the same cognitive goal via these different abilities; that if I'm good with space but bad with words (or better, if I *prefer* space to words), you can rearrange a verbal task so that it plays to my spatial strength.

That's where the idea goes wrong. First, the reason we make the distinction between types of tasks is that they are separable in the brain

and mind; we think verbal and visual are fundamentally different, not fungible. Second, while there are tasks that can be tackled in more than one way, these tasks are usually much easier when done in one way or another. For example, if I give you a list of concrete nouns, one at a time, and ask you to remember them, you could do this task verbally (by repeating the word to yourself, thinking of meaning, etc.) or visually (by creating a visual mental image). Even for people who are not very good at imagery, the latter method is a better method of doing the task. Josh Cuevas has an article showing this point coming out early next year: people's alleged learning styles don't count for anything in accounting for task performance, but the effects of a strategy on a task are huge.

A final note: I frequently hear from teachers that they learned about the theory in teacher education classes. I've looked at all of the well-known educational psychology textbooks,

and none of them present the idea as correct. However, neither do they debunk it. Teachers are, according to the survey, more accurate than the general public in their beliefs about learning, but they should be way ahead. Debunking these ideas in ed psych textbooks ought to help. ■

This article was published by the Fordham Institute on September 6, 2017. An earlier version of this article was originally published on Dr. Willingham's blog, "Daniel Willingham—Science & Education."



Daniel Willingham is professor of psychology at the University of Virginia. He is the author of *Why Don't Students Like School?*, *When Can You Trust the Experts?*, *Raising Kids Who Read*,

and *The Reading Mind* (forthcoming). In 2017 he was appointed by President Obama to serve as a member of the National Board for Education Sciences.

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