Allow me to introduce my selves

How the next generation is using technology to mask, reveal, and form identity
Driving the future of intelligent health

Amit Phadnis, Chief Digital Officer, GE Healthcare

As a technologist, I’m encouraged by the news, confirmed by MIT Technology Review Insights research in association with GE Healthcare, that artificial intelligence (AI) is starting to take hold in the healthcare industry.

It’s important to recognize, however, that AI is not an end unto itself but a tool to help bring about a necessary transformation of healthcare. We need to view AI in this broader context and understand the factors that will affect its adoption and its potential to advance healthcare around the world.

And now is the time. A combination of factors – aging populations, the expanding middle class, a shortage of healthcare professionals and rising costs – underscore the need to radically overhaul our healthcare systems – to bring about an era of “intelligent health” characterized by improved clinical outcomes and greater operational efficiency.

AI will play a role in ushering in this era. But there are a number of dependencies that must be addressed before AI can deliver the promised benefits.

The first thing has to do with data. The volume of health data – from medical records, digital images, monitoring systems and even wearables and implants – is growing exponentially. But this data exists in disparate forms, systems and locations. The critical challenge today is aggregating this data in forms that lend themselves to analysis by deep learning algorithms.

That’s why at GE Healthcare, we’ve launched an initiative to source data at scale and ensure it meets worldwide regulatory requirements. It’s also why we’ve developed the Edison intelligence platform that allows customers to develop new healthcare-specific applications, services and algorithms in a secure environment...and Edison Datalogue, an enterprise data management solution with vendor-neutral archiving that gives health systems a more holistic view of their data.

Over the next few years, we expect such platforms and solutions to become important drivers of healthcare innovation with thousands of applications and algorithms.

That’s critical, because no single player can bring about healthcare transformation. What’s needed is an ecosystem – partnerships between and among clinical practitioners, pharma and medtech leaders, technology companies and new AI innovators – to develop and connect the hundreds of thousands of applications, services and algorithms that will be required to meaningfully improve clinical care and operational efficiency.

With our 100-year heritage in health, intelligent data from a vast network of advanced medical devices, and years of experience building solutions specifically for the health sector, GE Healthcare is playing a pivotal role in advancing this future: the future of intelligent health.

Read a new report on how AI is already impacting healthcare today from MIT Technology Review Insights and GE Healthcare:

https://invent.ge/Aleffect

More than 78% of healthcare professionals report that their AI deployments have already created workflow improvements.

More than 1/3 will increase AI spending in the next two years.

According to new research from MIT Technology Review Insights, in association with GE Healthcare.
To grow up with technology, as my generation has, is to constantly question the self, to split into multiplicities, to try to contain our own contradictions. That sentence from Taylor Fang, the winner of our youth essay contest (page 36), neatly sums up the experience of juggling one’s identities on Facebook, Snapchat, TikTok, Instagram, and other platforms, each with its own unwritten norms of sharing and self-expression. But I think it also captures the struggle of adults trying to understand the role of technology in their children’s lives. How do ubiquitous digital devices influence the way young people learn, make friends, understand the world, and understand themselves? These are the questions we tackle in this issue, and the answers, too, contain many contradictions.

There’s growing evidence that the trend of outfitting schools with laptops and tablets hasn’t helped kids learn and may even hinder the most vulnerable ones, writes Natalie Wexler (page 18). In China, one company claims huge success in using artificial intelligence to deliver personalized learning, Karen Hao reports (page 24)—but is it just turning children into machines for passing standardized tests? A few universities have already installed voice assistants in every dorm room, and more are following suit. As Kathryn Miles explains, these devices are gleaning data about students’ first experiments with adulthood, and there’s no knowing how that data will be used in the future (page 62). Philosophy professor Ron Srigley’s students were shocked to discover just how much their studies and social lives improved when they surrendered their cell phones for two weeks, yet most couldn’t imagine giving them up for good (page 66). And when young adults finally enter the workforce, argues Malcolm Harris, they face a grim future of climate change, precarious career prospects, and economic and political unrest (page 10).

What about the common fears that technology is depriving kids of real human contact or warping their self-image under the pressure of social-media popularity contests? Here the answers are more mixed. Amelia Tate talked to wannabe child YouTube stars who never made it big. For the most part, she found that they’ve learned from their failures rather than being crushed by them (page 38). Cecilia Aragon describes how online fan-fiction communities have become both emotional lifelines and great writing schools for millions of sometimes socially awkward young people (page 44). From Korea, Max Kim reports on why, after more than four decades of moral panic about video-game addiction, it’s still not clear that it’s real (page 54). Andy Wright interviews some teens who, unlike Srigley’s students, aren’t married to their phones (page 69). And Anya Kamenetz (page 32) reports on how an Indian court case offers hope for defending children’s digital rights.

Fang explains in her essay why, for all the worries about privacy and social anxiety, creating and remixing online identities is fundamental to how her generation makes sense of itself. However, Kate Eichhorn warns that obsessively documenting and posting one’s life online means people will forever be haunted by their youthful indiscretions (page 74). That, she argues, is bad for society as a whole, because it makes it harder for anyone to change their mind about things.

In a lighter vein, children can learn the fundamentals of artificial intelligence by playing Karen Hao’s AI bingo game, adapted from research done at MIT (page 48). And in this issue’s short story (page 79), Fonda Lee imagines what happens when a young man acquires an AI girlfriend to keep his parents off his back, but quickly gets out of his depth.

Did we miss any important questions? And—especially if you’re a young person—did we get anything wrong? Write and let me know at gideon.lichfield@technologyreview.com.
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Instead of never-ending progress, today’s kids face a world on the edge of collapse. What next?
The founder of macroeconomics predicted that capitalism would last for approximately 450 years. That’s the length of time between 1580, when Queen Elizabeth invested Spanish gold stolen by Francis Drake, and 2030, the year by which John Maynard Keynes assumed humanity would have solved the problem of our needs and moved on to higher concerns.

It’s true that today the system seems on the edge of transformation, but not in the way Keynes hoped. Gen Z’s fate was supposed to be to relax into a life of leisure and creativity. Instead it is bracing for stagnant wages and ecological crisis.

In a famous essay from the early 1930s called “Economic Possibilities for Our Grandchildren,” Keynes imagined the world 100 years in the future. He spotted phenomena like job automation (which he called “technological unemployment”) coming, but those changes, he believed, augured progress: progress toward a better society, progress toward collective liberation from work. He was worried that the transition to this world without toil might be psychologically difficult, and so he suggested that three-hour workdays could serve as a transitional program, allowing us to put off the profound question of what to do when there’s nothing left to do.

Well, we know the grandchildren in the title of Keynes’s essay: they’re the kids and younger adults of today. The prime-age workforce of 2030 was born between 1976 and 2005. And though the precise predictions he made about the rate of economic growth and accumulation were strikingly accurate, what they mean for this generation is very different from what he imagined.

Instead of progress toward a labor-free utopia, America has experienced disappearing jobs as a kind of economic climate change. Apocalyptic forecasts loom while poor and working-class communities take the brunt of the early impacts: wage stagnation, deregulated and unsafe workplaces, an epidemic of opioid addiction. The increasingly profligate wealth on the other end of society is no less disturbing.

What the hell happened? To figure out why Generation Z isn’t going to be Generation EZ, we have to ask some fundamental questions about economics, technology, and progress. After we assumed for a century that a better world would appear on top of our accumulated stuff, the assumptions appear unfounded. Things are getting worse.

As recently as the first web boom two decades ago, it was still possible to talk about technological development and economic expansion as being good for everybody. Take Webvan, the early (and subsequently much derided) grocery delivery startup. The company planned to combine the efficiencies of the internet and other advances in information and logistics to provide better-quality products at lower prices, delivered directly to consumers by higher-paid and better-trained workers. It’s a univocal, Keynesian vision of development: not only do all involved benefit individually as consumers, employees, or capitalists, but society itself steps together up the mountain toward the elimination of necessity and a higher plane of being.

When Webvan went belly-up, analysts assumed it meant the core idea was hopelessly wrong: it just doesn’t make sense to use human capacity to bring individuals their supermarket orders. Harvard Business School professor John Deighton, when asked about the future of the industry in 2001, said, “Home-delivered groceries? Never.” Yet less than 20 years later I can have one of the world’s few trillion-dollar companies (Amazon) deliver my order via its grocery brand (Whole Foods) in an hour. And if that’s not fast enough, there are various platform services (Instacart, Postmates, and others) through which I can hire someone to go pick my order up and bring it to me immediately. Buzzing clouds of freelance servants, always in motion.

For consumers, these services have made life more convenient. For owners, stock prices and corporate profits have been cruising higher and higher for decades. But as workers, we have suffered. Gone is the Webvan vision of highly trained, highly paid, upwardly mobile, stock-holding delivery drivers. Amazon’s treatment of its workers at all levels is so intensely exploitative that former employees have created their own form of writing: the “report-back,” an essay that exposes the particular, common hardships of working at the firm. It’s one part worker’s inquiry, one part trauma diary.

Here’s how one warehouse employee described the workflow:

“The AI is your boss, your boss’s boss, and your boss’s boss’s boss: it sets the target productivity rates, the shift quotas, and the division of labor on the floor... Ultimately what this means to you is that you’ll rarely work with the same people twice; you’ll be isolated, put on random tasks from shift to shift, slog for stowing or sorting or picking or packing rates well exceeding your average—because your
supervisor told you so, and the program told him before that.”

Rather than relieving workers from toil, improvements in technology grind out their efficiencies by molding laborers into unreasonable shapes. Across departments, Amazon workers report being forced by the circumstances of their jobs to urinate in bottles and trash cans. Using layers of sub-contracting agreements, the largest firms insulate themselves from responsibility to and for their lowest-wage workers. Recent investigations into Amazon’s last-mile shipping reveal exhausted drivers whose required carelessness has, predictably, been known to kill people. The company remains, as far as the business community is concerned, exemplary.

Everywhere, the idea of liberation from work seems like a dream. Workers making parts for iPhones have been exposed to toxic chemicals; Taiwanese manufacturing giant Foxconn is regularly under the microscope for poor labor conditions. Instacart delivery workers went on strike to complain about changes that led to fewer tips; two days later the company cut their bonuses (Instacart says the two events are unrelated). Gig workers on the audio platform Rev.com recently discovered an overnight pay cut that meant Rev now takes 70 cents of every dollar a customer spends on getting audio transcribed, and they get a mere 30.

Young Americans are reaching prime working age in the Amazon economy, not the Webvan one. According to the Economic Policy Institute, while worker productivity increased 69.6% between 1979 and 2019, hourly pay has risen a measly 11.6%. “The income, wages, and wealth generated over the last four decades have failed to ‘trickle down’ to the vast majority largely because policy choices made on behalf of those with the most income, wealth, and power have exacerbated inequality,” the EPI says. The difference between productivity and pay is an increase in exploitation: workers doing more and getting less. That was not the plan.

Keynes and his policy vision fell out of fashion when the laissez-faire fundamentalism championed by Milton Friedman carried Reagan and Thatcher into global power. The old view of the future yielded to an era of deregulation and privatization. This was the “End of History,” with the free market as the proper—perhaps even inevitable—vehicle for human nature.

Here all pursue their individual interests, and together that adds up to the best of all possible worlds—at least as long as the government stays out of the way. We were taught as fact, for example, that rent-control policies counterintuitively increase rents, that minimum-wage laws counterintuitively hurt wages, that wealth from tax cuts trickles down to workers. (Attitudes on rent control are more nuanced today, while minimum-wage increases have raised incomes at the lowest end. The trickle-down theory has fared worst of all; the rich pocket, rather than reinvest, their tax cuts.) Most people bought the libertarian hype, and when the global financial crisis hit in 2008, many were surprised to find out markets weren’t actually self-regulating the way they had been told.

The subsequent bailouts, however, made it difficult to argue that governments could only ever get in the way of the economy’s proper functioning. And so economists dusted off Keynes. Countries that enthusiastically followed his advice and used public funds to stimulate demand came out of the recession much better off than those that hesitated. China’s decision in 2008 to inject stimulus spending worth more than 12% of GDP looks smart in retrospect. In America, Democrats and Republicans alike run for office on the promise of trillion-dollar spending proposals, not the bipartisan calls for a balanced budget and a shrinking government that we used to hear. The pendulum swung, and Keynes came back.

Switching from Friedman to Keynes means more than tinkering with the economy’s operating system, however. The two men had different ideas not just about how capitalism functions, but about what it’s for. Friedman and his ilk saw the market as maximizing individual man’s...
freedom to pursue his self-interest and thus, since the pursuit of self-interest is simply human nature, maximizing collective well-being. Capitalism was the means and the end.

Keynes, on the other hand, outstanding example of the English gentry that he was, couldn’t countenance money-grubbing as the highest example of virtue. There had to be something more. For Keynes the most dangerous kind of avarice was not trying to make money, but holding it in your pockets for too long. The only way to keep popular well-being high and employment up was to produce and consume more and more—not because it’s in our nature, but because that’s how the system works: it must grow to survive. But someday soon, he predicted, the race will be over, and we can all stop pretending capitalism isn’t a psychotic, Earth-destroying way to live.

In “Grandchildren,” Keynes looked forward to the day when “we shall be able to afford to dare to assess the money-motive at its true value.” He continued: “The love of money as a possession—as distinguished from the love of money as a means to the enjoyments and realities of life—will be recognised for what it is, a somewhat disgusting morbidity, one of those semi-criminal, semi-pathological propensities which one hands over with a shudder to the specialists in mental disease.”

Capitalism, to Keynes, does not justify itself. “There will be,” he wrote, “ever larger and larger classes and groups of people from whom problems of economic necessity have been practically removed.” But he never identified the mechanism that would end the capitalist accumulation game. Even if we did produce enough stuff to pass the finish line, how would we know? And who’s going to make the rich share, or even just stop taking more? He knew that we could keep growing along these lines for only so long, but he ruled out revolution. Instead, he thought the owners would do the right thing.

Not being Milton Friedman isn’t the same as being right about how the world works. Keynes can be right about growth predictions and business cycles and fiscal policy, but if he is wrong that capitalism will simply end of its own accord, the foundational justification for his entire program crumbles. In that case, all of society is strapped in riding shotgun on the semi-criminal, semi-pathological drive to consume the future in advance, with no virtuous end on the horizon.

Oops.

If the spectrum of traditional economics goes from Friedman to Keynes—from capitalism as an end in itself to capitalism as a means to something beyond it—then what we need now is a critique of what the two of them share, a critique of economics itself. Most such critiques were locked in a trunk and shoved under the bed in the late 1980s and early ’90s, but they are not gone.

The most famous and influential critic of economics remains Marx. Keynes didn’t think highly of the man; in the British economist’s reflections on visiting Soviet Russia in 1925 he declined to name him, instead making pointed references to “avaricious” Jews. But the commie who is not to be named had a different vision for the future of economic development.

Marx’s “immiseration thesis” is an idea that’s pretty easy to summarize: Since capitalists make money from every hour of workers’ labor, they will get increasingly rich over time, while workers won’t because they’re too busy making money for capitalists. A rising tide lifts only big boats; everyone else has to swim for it.

If technology reduced the need for work, Marx figured, workers would simply be made to work longer, harder, more efficiently, or on other things. Technology would create a population of the desperate unemployed who could be put to work making luxury goods, for which there would be an ever growing market—though growing only in terms of money, not in terms of the number of people wealthy enough to buy. Instead of the common good increasing, it’s inequality, exploitation, and misery that accumulate. What workers have been building this whole time is their own subordination, and they’ve been doing a good job.
As we near 2030—the year that capitalism was meant to be over, the time when we were meant to have advanced and elevated ourselves—the predictions are not rosy. In October 2018, the Intergovernmental Panel on Climate Change concluded that global warming is likely to reach 1.5 °C between 2030 and 2052 if temperatures continue to increase at the current rate. In the event we do hit that mark, experts predict a rise of between 26 and 77 centimeters (10 and 30 inches) in sea level, a rapid increase in species extinctions, hundreds of millions more people experiencing water and food shortages, and sustained extreme weather the likes of which the modern human species has never encountered. We have been stockpiling not just wealth, but disasters.

One protest sign at the youth climate strike put it succinctly: “You’ll die of old age. We’ll die of climate change.” Today’s kids never had the chance to believe in a simple progress narrative. The young movement leader Greta Thunberg took the eco-generational message to the United Nations Climate Action Summit: “People are suffering, people are dying, entire ecosystems are collapsing,” she chided. “We are in the beginning of a mass extinction and all you can talk about is money and fairy tales of eternal economic growth. How dare you!”

The younger cohort, the people around the world whom Thunberg represents, have no choice but to establish new standards for social well-being—standards beyond GDP growth. We need to get the carbon out of the atmosphere and the plastics out of the ocean, keep the oil in the ground and the undomesticated species we have left alive. Anything else is a catastrophic failure. Young people seem up to the challenge, and even if the press has occasionally overstated it, the afflity of millennials and Gen Z for socialism is real. It’s more than a decade after the 2008 crash, and in the United States we are in the longest economic expansion in history, yet poll after poll shows left-wing politics enduring within the younger cohort. A YouGov poll found that support for capitalism among Americans under 30 fell from 39% to 30% between 2015 and 2018—14 percentage points below the average and 26 points below the figure for seniors.

The kids recognize that capitalism has been using up human and natural resources rather than building a better society. Rather than a mere reaction to the housing crash and global warming, we can see a deep, emergent understanding. Much to everyone’s surprise, Keynes’s grandchildren have become Marxists.

When Keynes wrote that he looked forward to “the greatest change which has ever occurred in the material environment of life for human beings in the aggregate,” he meant us, now. And it looks as if he was right at least in one sense. The fate of our species—and many other species, for that matter—hangs in the balance.

Though Keynes’ bottom line now seems fanciful, there are ways in which his 1930 prediction wasn’t totally off. Besides getting the growth rate more or less right, Keynes thought we would be the generational cohort to end capitalism. The system was not supposed to be sustainable for even 500 years. At a certain level of technological development and capital accumulation, capitalism becomes not merely exploitative or even genocidal (achievements long registered); it becomes difficult to reconcile with humanity itself.

Like football, where the increasing size and strength of the players has made brain damage almost certain at the highest levels of the game, capitalist production has become an objective hazard for the entirety of human society.

One way or another, it’s a good bet that the workforce of 2030 is the last true cohort that market capitalism gets. It’s hard to say what comes next, but it has to happen pretty soon. The grandchildren he spoke of have been here for a while now. Whether or not we manage to understand what it means in advance, the new is here.  

Malcolm Harris is a writer and editor based in Philadelphia, and the author of Kids These Days and the forthcoming Shit Is Fucked Up and Bullshit.
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MIT Technology Review
Can technology help kids study? In the United States, putting devices in schools is undermining learning, especially in poorer areas. In China, on the other hand, a company claims to be using artificial intelligence to transform how children are taught, and it’s taking the country by storm.
In a first grade classroom I visited a few years ago, most of the six-year-olds were using iPads or computers. They were working independently on math problems supposedly geared to their ability, while the teacher worked separately with a small group. I watched as one boy, whom I’ll call Kevin, stared at an iPad screen that directed him to “combine 8 and 3.” A struggling reader (like almost all his classmates), he pressed the “Listen” button. But he still didn’t try to provide an answer.

“Do you know what combine means?” I asked. Finding that he didn’t, I explained it meant “add.” Satisfied that I’d put Kevin on the path to success, I moved on to observe other students—and found their iPads displaying sentences like Round 119 to the nearest ten and Find the area of the following triangle in square units. If Kevin didn’t understand combine, were other kids understanding words like round and area? Not to mention square units?

Then I found a boy staring at a computer screen showing a number line with the question What number comes before 84? He listened to the instructions and tried 85, then 86, then 87, getting error messages each time. Thinking the problem was the size of the numbers, I
asked him what number comes before four. “Five?” he guessed. It dawned on me that he didn’t understand the word before. Once I explained it, he immediately clicked on 83.

I returned to Kevin to see whether he had been able to combine 8 and 3. But I found he was drawing bright pink lines on the iPad with his finger—one of the gizmo’s numerous distracting capabilities.

“Can you answer the question?” I asked.

“I don’t want to.” He sighed. “Can I play a game?”

The school that Kevin and his classmates attend, located in a poor neighborhood in Washington, DC, prides itself on its “one-to-one” policy—the increasingly popular practice of giving each child a digital device, in this case an iPad. “As technology continues to transform and improve our world,” the school’s website says, “we believe low-income students should not be left behind.”

Schools across the country have jumped on the education technology bandwagon in recent years, with the encouragement of technophile philanthropists like Bill Gates and Mark Zuckerberg. As older education reform strategies like school choice and attempts to improve teacher quality have failed to bear fruit, educators have pinned their hopes on the idea that instructional software and online tutorials and games can help narrow the massive test-score gap between students at the top and bottom of the socioeconomic scale. A recent Gallup report found that 89% of students in the United States (from third to 12th grade) say they use digital learning tools in school at least a few days a week.

Gallup also found near-universal enthusiasm for technology on the part of educators. Among administrators and principals, 96% fully or somewhat support “the increased use of digital learning tools in their school,” with almost as much support (85%) coming from teachers. But it’s not clear this fervor is based in evidence. When asked if “there is a lot of information available about the effectiveness” of the digital tools they used, only 18% of administrators said yes, along with about a quarter of teachers and principals. Another quarter of teachers said they had little or no information.

In fact, the evidence is equivocal at best. Some studies have found positive effects, at least from moderate amounts of computer use, especially in math. But much of the data shows a negative impact at a range of grade levels. A study of millions of high school students in the 36 member countries of the Organisation for Economic Co-operation and Development (OECD) found that those who used computers heavily at school “do a lot worse in most learning outcomes, even after accounting for social background and student demographics.” According to other studies, college students in the US who used laptops or digital devices in their classes did worse on exams. Eighth graders who took Algebra I online did much worse than those who took the course in person. And fourth graders who used tablets in all or almost all their classes had, on average, reading scores 14 points lower than those who never used them—a differential equivalent to an entire grade level. In some states, the gap was significantly larger.

A 2019 report from the National Education Policy Center at the University of Colorado on personalized learning—a loosely defined term that is largely synonymous with education technology—issued a sweeping condemnation. It found “questionable educational assumptions embedded in influential programs, self-interested advocacy by the technology industry, serious threats to student privacy, and a lack of research support.”

Judging from the evidence, the most vulnerable students can be harmed the most by a heavy dose of technology—or, at best, not helped. The OECD study found that “technology is of little help in bridging the skills divide between advantaged and disadvantaged students.” In the United States, the test score gap between students who use technology frequently and those who don’t is largest among students from low-income
COLLEGE STUDENTS WHO USED LAPTOPS OR DIGITAL DEVICES IN THEIR CLASSES DID WORSE ON EXAMS. EIGHTH GRADERS WHO TOOK ALGEBRA I ONLINE DID MUCH WORSE THAN THOSE WHO TOOK THE COURSE IN PERSON.

families. A similar effect has been found for “flipped” courses, which have students watch lectures at home via technology and use class time for discussion and problem-solving. A flipped college math class resulted in short-term gains for white students, male students, and those who were already strong in math. Others saw no benefit, with the result that performance gaps became wider.

Even more troubling, there’s evidence that vulnerable students are spending more time on digital devices than their more privileged counterparts. High school students in questionable online “credit recovery” courses are disproportionately likely to be poor or members of minority groups (or both). “Virtual” charter schools—which offer online classes and generally produce dismal results—often enroll struggling students. A national charter network called Rocketship Public Schools, which serves low-income communities, relies heavily on technology, with even students in kindergarten spending 80 to 100 minutes a day in front of screens. One study found that in schools serving relatively affluent populations, 44% of fourth graders never used computers, compared with 34% in poorer areas.

The dangers of relying on technology are also particularly pronounced in literacy education and at early grade levels. Unfortunately, to judge from my observations of classrooms at high-poverty schools like the one Kevin attends, that’s exactly how and when digital devices are commonly used. The bulk of the elementary school day—three hours or more, at some schools—is spent on “reading” and the rest on math. Especially in schools where standardized reading and math scores are low, subjects like social studies and science have largely disappeared from the curriculum. And the standard class format is to have students rotate through “centers,” working independently on reading and math skills while the teacher works with a small group. In the classrooms I’ve been in, at least one of the centers always involves working on a digital device.

Why are these devices so unhelpful for learning? Various explanations have been offered. When students read text from a screen, it’s been shown, they absorb less information than when they read it on paper. Another frequently cited culprit is the distraction the devices afford—whether it’s a college student checking Instagram or a first grader like Kevin drawing bright pink lines with his finger. But there are deeper reasons.

One is motivation. If Kevin had been asked to combine 8 and 3 by a teacher rather than an iPad, there’s a greater chance he would have been interested in trying to do it. “It’s different when you’re learning from a person and you have a relationship with that person,” cognitive psychologist Daniel Willingham has said. “That makes you care a little bit more about what they think, and it makes you a little bit more willing to put forth effort.”

At least one education entrepreneur agrees. Larry Berger is CEO of Amplify, a company that develops digitally enhanced curricula in math, science, and literacy for kindergarten through eighth grade. Berger observes that while technology can do a credible job of imparting information, it’s not so good at demonstrating the “social usefulness” of knowledge. “For that,” he says, “you have to be getting that knowledge in a social context with other kids and a teacher, and ideally a teacher you want to be like someday.” While that may be a problem at schools that use a relatively modest amount of technology, it could be an even bigger one at schools like those in the Rocketship network, where one or two minimally trained supervisors oversee as many as 90 students during “Learning Lab” time. The schools have achieved impressive test results, especially in math, but an NPR investigation in 2016 found a repressive environment at many Rocketship schools. According to some parents and teachers, harsh discipline was used to keep students on task.

In addition to sapping motivation, technology can drain a classroom of the communal aspect of learning. The vision of some ed tech advocates is that each child should sit in front of a screen that delivers lessons tailored to individual ability levels and interests, often on subjects chosen by the students themselves. But a vital part of education is different kids bouncing their ideas off each other. I saw this in action on a regular basis in another, largely technology-free elementary classroom I followed through a school year. Under the guidance of their teacher, second graders—all from low-income families, including many that did not speak English at home—regularly engaged in debates about topics like whether Alexander the Great’s “ambitious nature” was “an inspiration or a flaw.”
Allowing students to choose the topics they’ll learn about can also lead to serious gaps in knowledge for children who don’t know much about the world—or even for those who do. One personalized-learning skeptic has observed, “If allowed to choose my own content in elementary school, I would have become an expert in princesses and dogs.”

Then there’s the difficulty of using technology to meet individual students at their actual level—as evidenced by Kevin’s failure to understand the word combine and his classmate’s difficulty with the word before. Children are supposed to take “pre-tests” designed to steer them to software that provides just the right degree of challenge. But kids sometimes forget to take the tests. Even when they do, the program can make faulty assumptions about what they can understand. In a first grade classroom at another school, I observed a group of students using a reading comprehension program. One girl’s screen displayed a seemingly random collection of facts about bananas, including “Most bananas come from India.” That was followed by a multiple-choice question. Unable to read the word “India,” the girl asked a classmate where bananas come from. “From trees,” the classmate replied—which was not one of the possible answers.

But even if technology could be calibrated to meet students where they truly are—or to foster communal learning—there’s another fundamental problem. Technology is primarily used as a delivery system. Maybe it can deliver instruction better than a human being in some circumstances. But if the material it’s delivering is flawed or inadequate, or presented in an illogical order, it won’t provide much benefit.

The way Berger puts this is that for most things we want kids to learn, we don’t have a “map” that can be used to create software. By that he means, he told me, that in only a few areas is there a clearly defined set of concepts and a cognitively determined sequence in which they should be learned. In math, he said, “there’s a developmental stage in which brains are ready to think about part/whole, and if you try to teach fractions before that has happened, that doesn’t work.” Foundational reading skills are similar: first kids need to learn to match letters to sounds, and then they can learn how to blend those sounds together in sounding out a word. For pretty much everything else, Berger says, we really don’t know what should be taught or in what order.

What technology is often used for, especially in elementary schools, is practice in reading comprehension skills. Even in classrooms devoid of technology, children waste hours every week supposedly learning how to “find the main idea” or “make inferences.” The content is random—clouds one day, zebras the next—and in any event, it’s considered relatively unimportant. Teachers choose books to read aloud based on how well they lend themselves to demonstrating the skill of the week, and students then practice it on books easy enough for them to read independently. When computers and tablets are used, the programs take the same content-agnostic, skills-focused approach. In one classroom, I saw a first grader in front of a screen that displayed a choice of topics including Diwali, fast food, crayons, and Barack Obama. (It turned out the student had neglected to take the pre-test and couldn’t read any of the texts.)

But as cognitive scientists have long known, the most important factor in reading comprehension isn’t generally applicable skill; it’s how much background knowledge and vocabulary the reader has relating to the topic. In a study done in the late 1980s, researchers divided seventh and eighth graders into two groups, depending on how well they had scored on a standardized reading comprehension test and how much they knew about baseball. Then they gave them all a passage about a baseball game. When the researchers tested the kids’ comprehension, they found that those who knew a lot about baseball all did well, regardless of how they’d scored on the reading test—and the “poor readers” who

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**Most students in the US are using ed tech tools every day**

<table>
<thead>
<tr>
<th>Question: How often do you use digital learning tools?</th>
<th>Percentage of students who answered “every day”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All students</strong></td>
<td>57%</td>
</tr>
<tr>
<td><strong>Elementary school students</strong></td>
<td>45%</td>
</tr>
<tr>
<td><strong>Middle school students</strong></td>
<td>64%</td>
</tr>
<tr>
<td><strong>High school students</strong></td>
<td>63%</td>
</tr>
</tbody>
</table>

**Teachers use digital learning tools across subject matter**

<table>
<thead>
<tr>
<th>Question: On a typical day, how much class time do you spend using digital learning tools to teach the following subjects?</th>
<th>Percentage of teachers who answered either all or half of class time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History/ Social studies</strong></td>
<td>65%</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td>53%</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td>50%</td>
</tr>
<tr>
<td><strong>Math</strong></td>
<td>50%</td>
</tr>
<tr>
<td><strong>Special education</strong></td>
<td>46%</td>
</tr>
<tr>
<td><strong>Reading</strong></td>
<td>42%</td>
</tr>
</tbody>
</table>

SOURCE: “EDUCATION TECHNOLOGY USE IN SCHOOLS,” GALLUP REPRESENTATIVE SAMPLES OF 3,210 AMERICAN PUBLIC SCHOOL TEACHERS AND 2,696 STUDENTS WERE SURVEYED IN EARLY 2019. SAMPLING ERROR IS JUST OVER 2%. DIGITAL LEARNING TOOLS ARE DEFINED AS “WEBSITES, APPS, ONLINE TUTORIALS, ONLINE GAMES AND VIDEOS OR PROGRAMS USED TO TEACH AND SUPPORT STUDENT LEARNING AND SCHOOLWORK.”
knew a lot about baseball did significantly better than the “good readers” who didn’t. That study, which has been replicated in a number of other contexts, provides compelling evidence that knowledge of the topic is more important to comprehension than “skills.”

That means the way to build reading comprehension is to adopt a curriculum that has kids spending at least a couple of weeks on a particular topic, to build knowledge and the vocabulary that goes with it. That’s especially true for children from less educated families, like Kevin and his classmates, who are unlikely to pick up much sophisticated knowledge at home—and may lack even basic vocabulary like before.

Could technology help build knowledge? Perhaps. Software designed on principles drawn from cognitive science has been shown to boost retention and even critical thinking, when harnessed to a particular body of information. Amplify, unlike most other ed tech companies, publishes content-rich curricula for both reading and science. But Berger is wary of using technology as what he calls a “practice/memorization/automaticity support.”

“The fear I have there,” he says, “is does learning get reduced to that?” In which case you might again confront the motivation problem.

So what role does Berger see for ed tech? Rather than asking “What are the parts of education that a computer can do instead of a human?” he thinks the question should be “What are teachers trying to do, and how do we help them do those things?” That means giving them a better understanding of what’s going on in the classroom, saving them time, and enabling them “to reach more kids directly more often.”

The example he gives is a classroom where—as is not uncommon—there’s a wide range of abilities. Rather than the frequently taken approach of giving different students material of differing levels of complexity, Berger says, it’s better to give all kids the same content. That would enable all students to grapple with the same information. But he suggests then assigning them different tasks depending on their abilities. All students could be reading the Declaration of Independence, for example, but the more able writers might be told to compose an essay, while others could be asked to write one or more sentences, each one focusing on a key aspect of the document. For many teachers, that kind of “differentiation,” as it’s called, is very hard. Berger claims technology makes it easier to group students by ability, give them appropriate tasks, and assess their performance. Plus, he says, “it’s all invisible at the student level.” With computers, kids don’t know who is in which group.

That’s a far more modest role for education technology than most in the sector have advocated—possibly too modest. Videos and audio recordings can help bring topics to life or give kids access to texts they would struggle to read for themselves. Online textbooks can be easily updated. Math software could be used to facilitate debate between students who arrive at different answers to the same problem. Technology can also enable motivated, gifted students who might be bored in class to race ahead of their peers or take online lessons that aren’t taught at their school.

Still, recognition seems to be growing that technology can be counterproductive. Suburban Baltimore County began abandoning textbooks and paper five years ago, with the goal of attaining a one-to-one ratio of devices to students. But test scores have slipped, and parents are skeptical that the move to screens is helping kids learn. Partly in response to complaints, the district decided to use fewer computers in the early elementary grades, adopting a one-to-five ratio instead. Lower-income parents may be having doubts too: Rocketship had to drop plans to open a third school in Washington, DC, after only 22 students signed up.

Educators and reformers aiming to advance educational equity also need to consider the mounting evidence of technology’s flaws. Much attention has been focused on the so-called digital divide—the relative lack of access that lower-income Americans have to technology and the internet. That’s legitimate: Kevin and students like him need to learn how to use computers to access information online and, more generally, to navigate the modern world. But let’s not create a digital divide of the opposite kind by outsourcing their education to devices that purport to build “skills” while their peers in richer neighborhoods enjoy the benefits of being taught by human beings.

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Natalie Wexler is the author of *The Knowledge Gap: The Hidden Cause of America’s Broken Education System—And How to Fix It*.
Born in China,

IN RECENT YEARS, THE COUNTRY HAS RUSHED TO PURSUE “INTELLIGENT EDUCATION.” NOW ITS BILLION-DOLLAR ED TECH COMPANIES ARE PLANNING TO EXPORT THEIR VISION OVERSEAS.

ZHOU YI was terrible at math. He risked never getting into college. Then a company called Squirrel AI came to his middle school in Hangzhou, China, promising personalized tutoring. He had tried tutoring services before, but this one was different: instead of a human teacher, an AI algorithm would curate his lessons. The 13-year-old decided to give it a try. By the end of the semester, his test scores had risen from 50% to 62.5%. Two years later, he scored an 85% on his final middle school exam.

“I used to think math was terrifying,” he says. “But through tutoring, I realized it really isn’t that hard. It helped me take the first step down a different path.”

Experts agree AI will be important in 21st-century education—but how? While academics have puzzled over best practices, China hasn’t waited around. In the last few years, the country’s investment in AI-enabled teaching and learning has exploded. Tech giants, startups, and education incumbents have all jumped in. Tens of millions of students now use some form of AI to learn—whether through extracurricular tutoring programs like Squirrel’s, through digital learning platforms like 17ZuoYe, or even in their main classrooms. It’s the world’s biggest experiment on AI in education, and no one can predict the outcome.

Silicon Valley is also keenly interested. In a report in March, the Chan-Zuckerberg Initiative and the Bill and Melinda Gates Foundation identified AI as an educational tool worthy of investment. In his 2018 book *Rewiring Education*, John Couch, Apple’s vice president of education, lauded Squirrel AI. (A Chinese version of the book is coauthored by Squirrel’s founder, Derek Li.) Squirrel also opened a joint research lab with Carnegie Mellon University this year to study personalized learning at scale, and then export it globally.

But experts worry about the direction this rush to AI in education is taking. At best, they say, AI can help teachers foster their students’ interests and strengths. At worst, it could further entrench a global trend toward standardized learning and testing, leaving the next generation ill prepared to adapt in a rapidly changing world of work.

As one of the largest AI education companies in China, Squirrel highlights this tension. And as one of the best poised to spread overseas, it offers a window into how China’s experiments could shape the rest of the world.

BY KAREN HAO
PHOTOGRAPHS BY NOAH SHELDON
The learning center that Zhou attends, one of the first that Squirrel opened, occupies the second floor of an unassuming building on a busy commercial road in Hangzhou, a second-tier city in Zhejiang province. Company awards line the walls in the stairwell. Further in, large photographs of at least a dozen men are on display; half of them are Squirrel AI’s executives and the others are master teachers, a title bestowed on the best teachers in China, who help develop the company’s curriculum.

The school’s interior decorations are modest. The foyer is small and colorful, with lime-green accents. Photos of smiling students hang along the corridor between six or so classrooms. Inside, faded decals of trees and simple mottos like “Be humble” enliven the walls. There are no whiteboards, projectors, or other equipment—just one table per room, meant for six to eight people.

The vehicle of instruction is the laptop. Students and teachers alike stare intently at screens. In one room, two students wear headsets, engrossed in an English tutoring session. In another, three students, including Zhou, take three separate math classes. They work out practice problems on pieces of paper before submitting their answers online. In each room, a teacher monitors the students through a real-time dashboard.

At different points, both teachers notice something on their screen that prompts them to walk over and kneel by a student’s chair. They speak in hushed tones, presumably to answer a question the tutoring system can’t resolve. Though I’m just feet away, I can’t distinguish their words above the soft hum of traffic on the street below.

“It’s so quiet,” I whisper. The Hangzhou regional director smiles: “There are no sounds of teachers lecturing.”

Three things have fueled China’s AI education boom. The first is tax breaks and other incentives for AI ventures that improve anything from student learning to teacher training to school management. This makes them good bets for venture capitalists. According to one estimate, China led the way in over $1 billion invested globally last year in AI education. Second, academic competition in China is fierce. Ten million students a year take the college entrance exam, the gaokao. Your score determines whether and where you can study for a degree, and it’s seen as the biggest determinant of success for the rest of your life. Parents willingly pay for tutoring or anything else that helps their children get ahead.

Finally, Chinese entrepreneurs have masses of data at their disposal to train and refine their algorithms. The population is vast, people’s views on data privacy are much more lax than in the West, and parents are big believers in the potential of technology, having seen how much it has transformed the country in just a few decades.

Squirrel focuses on helping students score better on annual standardized tests, which taps straight into national gaokao anxiety; more than 80% of its students return year after year, it says. It also designed its system to capture ever more data from the beginning, which has made possible all kinds of personalization and prediction experiments. It heavily markets its technical capabilities through academic publications, international collaborations, and awards, which has made it a darling of the Shanghai local government.

The strategy has fueled mind-boggling growth. In the five years since it was founded, the company has opened 2,000 learning centers in 200 cities and registered over a million students—equal to New York City’s entire public school system. It plans to expand to 2,000 more centers domestically within a year. To date, the company has also raised over $180 million in funding. At the end of 2018, it gained unicorn status, surpassing $1 billion in valuation.

Squirrel isn’t the first company to pursue the concept of an AI tutor. The earliest efforts to “replicate” teachers date back to the 1970s, when computers first started being used in education. Then, between 1982 and 1984, several studies in the US showed that students who received one-on-one human tutoring performed far better than students who didn’t. This set off a new wave of efforts to re-create that kind of individual attention in a machine. The result was adaptive learning systems, which can now be found everywhere from kindergartens to workplace training centers.

Squirrel’s innovation is in its granularity and scale. For every course it offers, its engineering team works with a group of master teachers to subdivide the subject into the smallest possible conceptual pieces. Middle school math, for example, is broken into over 10,000 atomic elements, or “knowledge points,” such as rational numbers, the properties of a triangle, and the Pythagorean theorem. The goal is to diagnose a student’s gaps in understanding as precisely as possible. By comparison, a textbook might divide the same subject into 3,000 points; ALEKS, an adaptive learning platform developed by US-based McGraw-Hill, which inspired Squirrel’s, divides it into roughly 1,000. Once the knowledge points are set, they are paired with video lectures, notes, worked examples, and practice problems. Their relationships—how they build on each other and overlap—are encoded in a “knowledge graph,” also based on the master teachers’ experience.

A student begins a course of study with a short diagnostic test to assess how well she understands key concepts. If she correctly answers an early question, the system will assume she knows related concepts and skip ahead. Within 10 questions, the system has a rough sketch of what she needs
to work on, and uses it to build a curriculum. As she studies, the system updates its model of her understanding and adjusts the curriculum accordingly. As more students use the system, it spots previously unrealized connections between concepts. The machine-learning algorithms then update the relationships in the knowledge graph to take these new connections into account.

While ALEKS does some of this as well, Squirrel claims that ALEKS’s machine-learning optimizations are more limited, making it, in theory, less effective.

The students I speak to at the learning center have high praise for the tutoring program. All are finishing middle school and have been coming to the center for more than a year. One girl, Fu Weiyi, tells me she’s improved far faster than when she got individual tutoring from a human teacher. “Here, I have a teacher both on and offline,” she says. “Plus, the instruction is very targeted; the system can directly identify the gaps in my understanding.” Another student echoes the sentiment: “With the system, you don’t have to do tons of exercises, but it’s still effective. It really saves time.”

While I have to take their words with a grain of salt—the students are hand-picked and give their testimonials under intense supervision—I’m still touched by their belief that they’ve found a formula that works to ameliorate the often brutal academic environment. Zhou Yi’s story, perhaps not coincidentally, also neatly illustrates how Squirrel can help struggling students.

For Squirrel’s founder Li, this vision doesn’t stop at tutoring. He has ambitions to break out of the confines of after-school programming and integrate his curriculum directly into the main classroom. Squirrel is already in discussion with several schools in China to make its system the primary method of instruction.

I try to imagine what this world might be like, and whether we might be better off for it. I ask the students one last question: Is there anything that Squirrel could improve? A long pause. “I wish we had more interaction with our human teachers,” Fu says.

Every educational expert I spoke to for this story began by making the same point: to understand how AI could improve teaching and learning, you need to think about how it is reshaping the nature of work. As machines become better at rote tasks, humans will need to focus on the skills that remain unique to them: creativity, collaboration, communication, and problem-solving. They will also need to adapt quickly as more and more skills fall prey to automation. This means the 21st-century classroom should bring out the strengths and interests of each person, rather than impart a canonical set of knowledge more suited for the industrial age.

AI, in theory, could make this easier. It could take over certain rote tasks in the classroom, freeing teachers up to pay more attention to each student.

Squirrel’s approach may yield great results on traditional education, but it doesn’t prepare students to be flexible in a changing world, the experts I spoke to say. “There’s a difference between adaptive learning and personalized learning,” says Chris Dede, a professor at Harvard University in the Technology, Innovation, and Education Program. Squirrel is doing adaptive learning, which is about
“understanding exactly what students know and don’t know.” But it pays no attention to what they want to know or how they learn best. Personalized learning takes their interests and needs into account to “orchestrate the motivation and time for each student so they are able to make progress.”

Jutta Treviranus, a professor at the Ontario College of Art and Design University who pioneered personalized learning to improve inclusivity in education, breaks it down further. “Personalized learning has a number of levels,” she says: she calls them pace, path, and destination.

If the pace of learning is personalized, students with different abilities are allowed different amounts of time to learn the same material. If the path is personalized, students might be given different motivations to reach the same objectives (“Here’s why statistics is relevant to your love of baseball”) and offered the material in different formats (e.g., video versus text). If the destination is personalized, students can choose, for instance, whether to learn with a vocational school or a university in mind.

“We need students to understand their own learning. We need them to determine what they want to learn, and we need them to learn to learn,” Treviranus says. “Squirrel AI doesn’t address those things at all. It only makes it more efficient to bring all of the students to the same standardized place.”

Li, Squirrel’s founder, is tall and lanky and has severe cheekbones. When he speaks English, he punctuates every few sentences with “Right?”—eyebrows raised—to make sure you’re on the same page. When he speaks Mandarin, his words tumble out twice as fast.

A week after my visit to the learning center, I meet him at Squirrel’s headquarters in Shanghai. In the style of an understated showman, he gives me the grand tour. The modesty of the learning center stands in sharp contrast to the office décor here: each wall boasts of different details about the company and milestones it has reached. Here’s one with all its media mentions. Here’s another with all its awards. And here are some examples of students who were deemed “hopeless” and then saved. I run into another tour before I’ve finished my own.

Li doesn’t wait for the clip to end to reveal the punchline: “In three hours we understand students more than the three years spent by the best teachers.”

On screen, the teacher looks increasingly crestfallen and humiliated. “He looks so sad,” I say.

“You noticed!” Li laughs.

Much of Squirrel’s philosophy stems from Li’s own experiences as a child. When he was young, he didn’t have very good emotional intelligence, he says, and reading books on the subject didn’t help. So he spent half a year dividing the skill into 27 different components and trained himself on each one. He trained himself to be more observant, for example, and to be an interesting conversationalist (“I spent a lot of time finding 100 topics, so I have a lot of material to talk with others,” he says). He even trained himself to keep smiling when others criticized him. (“After that, in my life, I do not have any enemies.”) The method gave him the results he wanted—along with the firm belief that anything can be taught this way.

Li uses an analogy to lay out his ultimate vision. “When AI education prevails,” he says, “human teachers will be like a pilot.” They will monitor the readouts while the algorithm flies the plane, and for the most part they will play a passive role. But every so often, when there’s an alert and a passenger panics (say, a student gets bullied), they can step in to calm things down. “Human teachers will focus on emotional communication,” he says.

Squirrel is already exporting its technology abroad. It has cultivated its international reputation by appearing at some of the
largest AI conferences around the world and bringing on reputable collaborators affiliated with MIT, Harvard, and other research institutes. Li has also recruited several Americans to serve on his executive team, with the intent of pushing into the US and Europe in the next two years. One of them is Tom Mitchell, professor of computer science at Carnegie Mellon; another is Dan Bindman, who led the user experience and editorial teams at ALEKS.

Treviranus worries that Squirrel’s educational philosophy is representative of a broader flaw in China’s pursuit of intelligent education: its emphasis on standardized learning and testing. “The tragedy of the China experiments is that they’re taking the country to a point of education that any progressive pedagogue or education system is moving away from,” she says.

But she believes that China also has one of the best opportunities to reinvent a more teacher-friendly, learner-focused classroom environment. It is less entrenched than the West in older models of education and much more willing to try new ideas. “China needs to look at a completely different form of AI,” she says. The question is: What does that mean?

The answer may lie a dozen miles west of Squirrel’s headquarters, across Shanghai’s Huangpu River. There, Pan Pengkai, a children’s educational expert, is conducting experiments of a different nature.

Pan has been thinking about how to use AI in education for nearly two decades. Fifteen years ago, he founded his first ed tech company in China after getting his PhD from the MIT Media Lab. Inspired by his experience in grad school, he focused on building tools for learning English. “Innovation comes from difference,” he says. “That’s exactly what China lacks. If you are able to speak multiple languages, you are able to talk to different people; you are able to communicate different ideas.”

Pan now runs Alo7, a K–12 ed tech company with the same mission of teaching English. Unlike many other firms, it seeks to move away from test-oriented learning and instead foster creativity, leadership, and other soft skills. The company offers products and services for both physical and digital classrooms. It has an online learning platform paired with a collection of textbooks that help students learn and practice their language skills. It also has a service that connects up to three pupils via video with English tutors abroad for regular group lessons. To date, it has served some 15 million students and teachers and partnered with 1,500 institutions nationally.

Pan’s ultimate vision for AI in education is to get rid of standardized tests entirely. “Why do we test people for two or three hours to determine if they are good or bad?” he asks. He thinks AI will eventually create flexible learning environments that are as good for sensitive and creative students as for precise and analytical ones.

In 2018 Alo7 began to experiment more. It added face and voice analysis to its video tutoring sessions to produce summary reports of each lesson. Algorithms measure the amount of time the students spoke English in class, the accuracy of their English pronunciation, and basic indicators of their engagement and joy, such as the number of times they opened their mouth to speak and laugh. Last year, the company created several physical classrooms equipped with cameras and microphones to produce similar analyses. Teachers get reports on their own performance, too.

I go see one of Alo7’s intelligent classrooms for myself. It’s small but bursting with color. The walls are illustrated with the company’s mascots, five cartoon companions with distinct personalities, which appear throughout the company’s educational materials. There are neither tables nor chairs, just a bench that runs along the back wall. At the front are a whiteboard and two TVs for displaying the day’s curriculum.

There are no classes in session, but a company employee plays me some short clips of elementary school classes. In one, six students sit on a bench and practice saying the names of different animals. “Bird, bird, bird!” they chant with their teacher as she flaps her arms like wings. “Turtle, turtle, turtle!” they continue as the screen changes its display to a cartoon turtle. The teacher-student interactions take the foreground; the AI purposely fades, unnoticed, into the back.

Dede says the kind of data generated in an intelligent classroom could be useful, but he cautions that cameras and other sensors could also be misused to judge a student’s emotions or state of mind, applications that have little grounding in science and could lead to over-surveillance. Pan agrees that it’s important to be careful: “That’s why we provide the data mainly for teachers and not students, because we haven’t yet run scientific tests.” He has begun to see a shift in the national conversation. As government leaders have sought new ways to stimulate innovation, the idea of a “quality-oriented education”—one that emphasizes creativity and the liberal arts—has gained momentum.

In 2018 China’s education ministry passed a series of reforms, including stricter licensing for tutors, aimed at reducing the obsession with testing. Last year, the government also unveiled a set of guidelines to focus more on physical, moral, and artistic education, and less on exams. Though critics point out it still hasn’t eliminated the gaokao, Pan is optimistic about its intent to change.

“We want to change the future of Chinese education with technology,” he says. China’s current mass experiment in AI education, and the choices it must make, might also change education for the world.
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What “digital rights” should children have? The winner of our young writers’ essay contest enunciates a critique of what social media has become—and a vision of what it might be. For every famous child YouTube star there are thousands who never make it. And why the strange, giant universe of online fan fiction can help kids both learn to write and find themselves.
Pruthvirajsinh Zala was a 19-year-old first-year law student when he walked into the high court of Gujarat to argue his inaugural case. “It’s a big enormous building,” he says. “All black stone. There’s a giant statue of Gandhi. My petition says Pruthvirajsinh Zala v. State of Gujarat, so I am panicking—there are two government lawyers there against me.”

The subject of Zala’s case was PlayerUnknown’s Battlegrounds, or PUBG, a battle royale–style video game released two years ago by the South Korean company Bluehole. In the game, you’re dropped on a virtual island with 100 other players, and the winner is the last one standing. It’s similar to Fortnite: so similar, in fact, that the company behind PUBG sued Epic Games, the makers of Fortnite, claiming its formula had been stolen. (The case was eventually dropped.)

Arguably, PUBG is even more global than its rival, and since it is available on mobile phones and free to play, it caught on particularly in lower-income countries. India has perhaps as many as 50 million players, with regular tournaments held around the country and millions of people watching celebrity streamers in Hinglish, Tamil, and Telugu.

But while kids went wild for it, parents were freaking out.

RIGHTS
UNTIL NOW, TRYING TO PROTECT KIDS ONLINE HAS PRIMARILY MEANT KEEPING THEM OFF THE INTERNET. WHAT IF THERE WERE A DIFFERENT WAY?

By ANYA KAMENETZ
Illustration by AMRITA MARINO
There were concerns about bullying within the game, and reports of violence when parents tried to limit children’s play. PUBG was blamed for several deaths, including a 16-year-old boy who killed himself after his parents took the game away and two people reportedly so absorbed in playing that they were hit by a train.

PUBG responded by instituting age restrictions, face recognition, and parental controls. It even added a “health warning” that pops up after you’ve been playing for six hours straight. But that wasn’t enough for Gujarat. In March 2019, the state announced an outright ban on the game, supposedly a temporary block to help students concentrate on preparing for exams.

It’s not unusual for the authorities in India to interfere with technology use in this way. Apar Gupta, the head of the India Internet Freedom Foundation, says the country has one of the highest rates of internet shutdowns in the world. But while these usually put the burden of enforcement on service providers, the PUBG ban targeted players. Anyone caught playing faced fines and even potential jail time.

After the ban was enacted, 21 people were arrested in Gujarat. Mostly, they were Muslim teenagers and young men who gathered to play PUBG in tea shops in lower-middle-class neighborhoods. This is one of the first times in the world that arrests have been made merely for playing a game, according to Gregory Boyd, a partner at the law firm Frankfurt Kurnit Klein & Selz who specializes in gaming.

That’s when Zala—who was studying for his law degree at Nirma University in Gujarat’s largest city, Ahmedabad—stepped in. He’s never played PUBG. “I don’t have time for mobile games,” he says. “I spend more time studying.”

But he saw a miscarriage of justice. “This is arbitrary,” he told me. “This is completely unconstitutional. I’m not saying the game is all good, but if you’re banning it, you have to justify it.”

A fundamental human right to play video games? It might seem like a joke. But their freedom of association and assembly, much of which now happens online.

These were the very rights that were violated by the PUBG ban, argued Zala. The government’s lawyers said the ban was meant to ensure public safety. The game was addictive, and players were disturbing the peace.

“When a citizen plays PUBG in her own house or on her balcony, it is their choice,” Zala countered in the petition. “It is respecting their right to privacy, their right to be alone, and their right to make choices.”

This is a somewhat novel idea. Until now, protecting children on the web has primarily meant keeping them off it, just as the Indian government tried to do with PUBG. And even that’s not something we do very well.

In the US, the Children’s Online Privacy Protection Act, or COPPA, says that children under 13 shouldn’t be profiled or tracked for the purposes of targeted advertising, and shouldn’t have their data traded. This means they can’t use many services, such as social media, without lying about their age—but it’s an easy lie that’s rarely checked. 5Rights, a UK-based foundation that advocates for children, estimates that companies have assembled around 70,000 separate data points about any given child by the age of 18.

The trouble with this approach to protecting children is exemplified by YouTube. Last September the US Federal Trade Commission fined Google and YouTube a record $170 million for violations of COPPA. The complaint pointed out that while YouTube officially said it was not for anyone under 13, it was simultaneously touting itself to advertisers as “the new Saturday morning cartoons.” Rohit Chopra, a dissenting member of the bipartisan FTC who thought the fine was far too small, pointed out that YouTube almost certainly earned far more by “illegally spying on children” than it paid out.

Sonia Livingstone, who directs the Preparing for a Digital Future initiative at the London School of Economics, argues that having a binary toggle at age 13 neither
keeps children reliably safe nor allows them freedom to explore. “They should have access to all the resources that are going to help them,” she says. “When we get very kind of risk-focused, that’s when we curb kids, narrow down their range of options, and then they don’t get the opportunities to develop and express themselves and engage as agents in the world.”

Livingstone is one of the people thinking about how to apply a “child rights framework” to digital media instead. Along with 5Rights—which takes its name from a list of liberties that emerged partly in “deliberative consultation” with juries of children aged 11 to 14—she’s been helping the UK government come up with an “Age Appropriate Design Code” for the web. The goal, says 5Rights policy lead Jay Harman, is to make the internet a less predatory, less booby-trapped place to roam.

Those who adhere to the code cannot share data for under-18-year-olds, must do away with persuasive nudges meant to keep users on their site (such as autoplay or infinite scroll), and must shield young users from unsavory content suggestions and refrain from exposing their location. All of this must be explained in child-friendly language, with safety warnings if a user tries to change the settings.

The code says that sites can either offer this level of protection to all users, verify age through reliable means such as driver’s licenses, or allow children to self-declare. But, it adds, if they are caught mishandling young users there will be penalties.

Complying with the code could require a fundamental redesign of many services, user experiences, and revenue models, foremost among them behavioral advertising. And it’s likely to spread beyond the UK market too.

The California Consumer Privacy Act, which takes effect on January 1, 2020, restricts the sale of data on children under 16, and an update designed to strengthen COPPA is in the works in the US Senate as well. It could include an “erasure but” that would allow a minor to easily remove all personal data from any online service. Australia and the EU are looking at new laws too.

“It will be up to companies to decide how much effect [the UK law] will have on their wider services,” says Harman. “But if I was a betting man, I’d say they realize the writing is on the wall that these are becoming norms on the treatment of children.” (Google, Facebook, and Amazon declined to comment on the record for this story.)

Livingstone and Harman argue that upholding children’s rights in this way can create a better internet for everyone.

S

Still, new laws alone are no panacea. Just look at the GDPR, the EU’s data and privacy law: compliance has been expensive, and results have been mixed. Moreover, advertisers and marketers aren’t the only ones infringing on children’s digital rights. In the wake of school shootings, many schools in the US have hired private companies to monitor students’ online communications. The nonprofit Future of Privacy Forum estimates that such deals have happened in about one-third of school districts.

These systems scan all kinds of activity—anything from a Twitter post to a Google search, from an email to a term paper—looking for possible warning signs of violence in order to prevent it. But flagging terms from a watch list produces a lot of false alarms (posts about To Kill a Mockingbird or a basketball shooting clinic, for example), and there is little evidence that this kind of monitoring really reduces attacks. Nevertheless, a bill that would make these kinds of systems mandatory in all American schools was introduced in the US Senate in October.

The type of routine surveillance that has taken place in schools for decades is now becoming digitized too. A company called e-Hallpass, for example, tracks student visits to the bathroom. ClassDojo, a widely used classroom behavioral app, gives parents push notifications every time their child steps out of line.

And of course, young people around the world continue to face all kinds of censorship and restrictions. PUBG alone has been banned in Nepal, Iraq, and Jordan as well as in Gujarat. Consulting young people on policies that affect them is by no means the norm: whether you live in India or Britain or California, paternalism dies hard.

Zala was ultimately rewarded for his efforts. The judge asked Gujarati officials to submit better evidence in favor of the ban. Instead, the state suspended it. Zala got the news close to midnight. “My whole hostel [dorm] was celebrating—50 or 60 people,” he says. “We were really, really happy ... all my professors, my dean. It’s something which does not happen every day—a first-year law student arguing in front of the high court, making an impact on society and effecting change.” On his college’s “foundation day,” he received a medal.

Zala has decided to keep pushing for youth rights. He’s currently working on climate-change litigation, inspired by Greta Thunberg. “India has the largest youth population in the world,” he says. “Down the line, it’s all in our hands. We can’t remain silent if a game is banned, if dissenting opinions are trashed, if the climate is harmed. If we’re not speaking now, we won’t have anything left to say later.” Still, when his victory hit the papers, he came under fire.

“A lot of the feedback was negative,” he says. Some parents deemed PUBG a menace and called for the ban to be reinstated. “But,” he adds, “I know I did the right thing.”

Anyka Kamenetz is an education correspondent at NPR and the author of The Art of Screen Time.
To conceal, protect, shelter. The word signifies invisibility. I hid behind the screen. No one could see through the screen. The screen conceals itself: sensors and sheet glass and a faint glow at the edges; light, bluer than a summer day.

The screen also conceals those who use it. Our phones are like extensions of our bodies, always tempting us. Algorithms spoon-feed us pictures. We tap. We scroll. We click. We ingest. We follow. We update. We gather at traditional community hangouts only to sit at the margins, browsing Instagram. We can’t enjoy a sunset without posting the view on Snapchat. Don’t even mention no-phone policies at dinner.

Generation Z is entitled, depressed, aimless, addicted, and apathetic. Or at least that’s what adults say about us.

But teens don’t use social media just for the social connections and networks. It goes deeper. Social-media platforms are among our only chances to create and shape our sense of self. Social media makes us feel seen. In our Instagram “biographies,” we curate a line of emojis that feature our passions: skiing, art, debate, racing. We post our greatest achievements and celebrations. We create fake “finsta” accounts to share our daily moments and vulnerabilities with close friends. We find our niche communities of YouTubers.

It’s true that social media’s constant stream of idealized images takes its toll: on our mental health, our self-image, and our social lives. After all, our relationships to technology are multidimensional—they validate us just as much as they make us feel insecure.

But if adults are worried about social media, they should start by including teenagers in conversations about technology. They should listen to teenagers’ ideas and visions for positive changes in the digital space. They should point to alternative ways for teenagers to express their voices.

I’ve seen this from my own experience. When I got my first social-media account in middle school, about a year later than many of my classmates, I was primarily looking to fit in. Yet I soon discovered the
sugar rush of likes and comments on my pictures. My life mattered! My captions mattered! My filters! My stories! My followers! I was looking not only for validation, but also for a way to represent myself. Who do I want to be seen as? On the internet I wasn’t screaming into the void—for the first time, I felt acutely visible.

Yet by high school, this cycle of presenting polished versions of myself grew tiring. I was tired of feeling like I was missing out. I was tired of adhering to hypervisible social codes and tokens. By 10th grade, I was using social media only sporadically. Many of my friends were going through the same shifts and changes in their ideas about social media.

For me, the largest reason was that I had found another path of self-representation: creative writing. I began writing poetry, following poets on Twitter (with poems replacing pictures and news in my feed), and spending the majority of my free time scribbling in a journal outdoors. I didn’t feel I needed Facebook as much. If I did use social media, it was more for entertaining memes.

This isn’t to say that every teenager should begin creating art. Or that art would solve all of social media’s problems. But approaching technology through a creative lens is more effective than merely “raising awareness.” Rather than reducing teenagers to statistics, we should make sure teenagers have the chance to tell their own experiences in creative ways.

Take the example of “selfies.” Selfies, as many adults see them, are nothing more than narcissistic pictures to be broadcast to the world at large. But even the selfie representing a mere “I was here” has an element of truth. Just as Frida Kahlo painted self-portraits, our selfies construct a small part of who we are. Our selfies, even as they are one-dimensional, are important to us.

At this critical moment in teenagers’ and children’s lives, we all need to feel less alone and to feel as if we matter. Teenagers are disparaged for not being “present.” Yet we find visibility in technology. Our selfies aren’t just pictures; they represent our ideas of self. Only through “reimagining” the selfie as a meaningful mode of self-representation can adults understand how and why teenagers use social media. To “reimagine” is the first step toward beginning to listen to teenagers’ voices.

Meaning—scary as it sounds—we have to start actually listening to the scruffy video-game-hoarding teenage boys stuck in their basements. Because our search for creative self isn’t so different from previous generations. To grow up with technology, as my generation has, is to constantly question the self, to split into multiplicities, to try to contain our own contradictions. In “Song of Myself,” Walt Whitman famously said that he contradicted himself. The self, he said, is large, and contains multitudes. But what is contemporary technology if not a mechanism for the containment of multitudes?

So don’t tell us technology has ruined our inner lives. Tell us to write a poem. Or make a sketch. Or sew fabric together. Or talk about how social media helps us make sense of the world and those around us. Perhaps social-media selfies aren’t the fullest representations of ourselves. But we’re trying to create an integrated identity. We’re striving not only to be seen, but to see with our own eyes.

Taylor Fang is a senior at Logan High School in Logan, Utah.
children can become millionaires—seemingly overnight, without trying. The highest paid of them, eight-year-old Ryan Kaji, made $22 million in 2018 by playing with toys on his channel Ryan ToysReview (now Ryan’s World). There are now thousands of similarly famous child YouTubers: babies who have been vlogged since the moment of their birth, 10-year-old streamers showing off video-game tricks, teenage girls giving acne advice from their bedrooms. A survey of 3,000 children conducted by Lego this past summer found that the most coveted profession among those in the US and the UK is “vlogger/YouTuber.” (Astronaut was the least popular choice.) The word “kidfluencer” is now firmly entrenched in the vernacular.

For each of the world’s Ryans, though, there are millions of kids who log on to YouTube every day in the hopes of making it big. “Hi guys, and welcome back to my channel!” they all say, like some kind of invocation to the internet gods.

Why do so many kids want to be YouTubers? Do they only seek fame, or is there more to it: creativity, community, and a future career? How are their parents helping them? And what happens if, after spending thousands of dollars or dropping out of school, it doesn’t work out? We interviewed five not-so-famous young YouTubers from around the world to ask them what they get out of it.
Growth is painfully slow. At some point I was like, ‘Okay, there’s no point me doing this.’”
Mosomothane had just 558 subscribers to her channel—far too few for her to make any income. (YouTube requires users to have at least 1,000 subscribers for that.) “Growth is painfully slow. At some point, I was like, ‘Okay, there’s no point me doing this,’” Mosomothane says over Skype, shrugging her shoulders.

What keeps her going, when editing a vlog can take two to three hours out of her day? “I won’t even lie, it’s been a tough journey ... but I had to reevaluate everything,” she says. “I had to take a moment to be like, ‘There are people still supporting you.’ I love recording my day. I love editing. And I had to remind myself of stuff like that.”

No matter how long it takes, Mosomothane aims to reach 1,000 subscribers, but she’s realistic that YouTube likely won’t become her career. “I feel like in South Africa YouTube isn’t a thing that’s very stable, so I would feel more comfortable having it as a side hustle,” she says. For that to work, she’ll have to hope for better growth than she’s had so far: the YouTube analytics website Social Blade estimates that if a YouTuber gets 1,000 views a day, daily earnings will be anywhere from just 25 US cents to $4.

After high school, Mosomothane plans to study film, and hopes to be a producer. “I noticed over the years doing my channel that it’s fun—I would love to do this every day of my life,” she says. “And it kind of came to me. This is what it’s led up to. YouTube has helped me figure out what I want to do later in life, which is pretty cool.”

Dane

When he got his first subscriber in November 2016, seven-year-old Dane created a grateful video entitled “1 sub yas.” That “1 sub” is his grandma, and in the video he thanks her “so much” for subscribing to his channel while she grins in the background, glasses perched atop her head. Naturally, the video went viral.

A shoutout on various big YouTube channels, coverage on Mashable and The Daily Dot, and a popular Reddit thread pushed Dane quickly past 19,000 subscribers.

Dane’s mom, Tammy, a 44-year-old self-employed transcriber, keeps a spreadsheet of every shoutout Dane has received since. In 2018 PewDiepie, at the time the world’s most popular YouTuber, referenced him in a video and he shot to over 300,000 subscribers. On Dane’s eponymous channel, the now 10-year-old posts videos of himself playing games such as Roblox, an online multiplayer game popular with children under 12.

But when we speak over Skype, Dane hasn’t posted a video in two months. His second-to-last upload is entitled “My channel is pretty much dying”—he is now losing over 1,000 subscribers every time he posts. “I guess it’s because I don’t upload that often,” says Dane. “I just get too sad about it to make videos.” A silver YouTube Play Button, awarded for reaching 100,000 subscribers, gleams on the wall above his head.

Dane says he feels “pressured” to make more videos, but he also says he would like YouTube to be his career when he’s older (“because you can make a lot of money really quickly”).

Tammy, who is camera-shy and steps out of the frame for our conversation, says Dane has earned a total of around $9,000 in his last three years on YouTube. The shout-out from PewDiepie earned him a windfall that he chose to spend on a small vacation to Oklahoma City with his best friend.

“It felt good—I had a lot of fun,” he says. Yet a declining viewership takes its toll: the merchandise he made didn’t sell well, and although he set up a PO box for fan mail, nothing ever came. “It makes me sad because I actually wanted people to send me stuff,” he says, turning away from the camera and lying down on the family sofa.

What will he be if he can’t be a YouTuber? “I’d like to be a chemist. I’m very interested in science—the periodic table and stuff like that.”
So you wanna be a kidfluencer?

Siddhika

Seven-year-old Siddhika is young enough to know she wants to be a YouTuber, but not old enough to really know why. “I don’t knooowww-wuh!” she intones shyly when her mother asks her to sit up straighter during her interview. Yet while she’s quiet in conversation, she is a natural when broadcasting. On her channel, Siddhika’sToysAndTales, which has around 200 subscribers, she unboxes Barbie dolls, makes slime, and paints and draws with effortless confidence.

“Welcome to my channel,” she shouts at the start of her Barbie unboxing video. “Don’t forget to subscribe!”

Siddhika’s mom, Trishna, a 33-year-old software engineer, says her daughter picked up the language of the vlogger all on her own. “I didn’t even tell her one line,” she says. “This generation—they don’t see TV shows or movies. She has just grown up watching YouTube. That’s why I think being a YouTuber comes more naturally to her.”

Trishna says Siddhika started asking for her own YouTube channel when she was just three, but the family began filming shortly before her seventh birthday. The weekly videos take over an hour to film and multiple days to edit. “She always tells me, ‘Mama, I don’t know how you do it, but you’ve got to do it.’” Trishna says. “You have to make my videos because my friends will watch and it’s fun…I think she’s already on that track where she’s getting attention and she’s liking it.”

But for Trishna, YouTube fame isn’t something to be glorified. She says she doesn’t let Siddhika know the number of subscribers on her channel and doesn’t want her to get in “famous mode” if the channel grows. “I don’t want her to become rude. It’s not easy to be famous, especially not for a kid,” she says. “She has been wanting this for a very long time. If she grows at it—if she creates good videos, good content, and if she can grow a fan base—then we are supportive.” On the other hand, Trishna says, the family may stop making videos if she gets too busy with work, or if Siddhika changes her mind and becomes embarrassed by the channel.

“It’s fun!” Siddhika finally pipes up near the end of the interview. “It’s fun while filming the videos [she hasn’t quite gotten the knack of saying “filming” yet] and it’s fun that people watch the videos.” Trishna apologizes that her daughter isn’t very talkative. “She doesn’t even know what an interview really is,” she says. But there is one question Siddhika has a ready answer for. Would she like to be famous? “Yes!”

Igor van Lamsweerde

When he was 17, Igor van Lamsweerde decided to drop out of school. His YouTube channel was growing consistently, he had started earning more money than his parents, and over 65,000 subscribers tuned in to watch him do challenges, play with fidget spinners, and answer questions from fans. “I remember sitting in class and my only thought was about what videos I was going to make when I was home,” van Lamsweerde says. “I was already thinking about dropping school because I didn’t really enjoy it…When I gained all these followers, it was easy to say, ‘Okay, I’m done. Let’s not go anymore.’”

But the last video on van Lamsweerde’s channel is now over a year old, and he hasn’t uploaded consistently for over two years. In his second-to-last video he begged his viewers for guidance, complaining. “YouTube is so fucking hard.”

“When I quit school and pursued making these videos it went great for a few months,” he says now. “But at some point I saw a decrease in viewership and followers … It was
hard. Like, you work really hard on these videos and see that people are not interested anymore.” The grind of making and editing daily videos took a toll on him: “Looking back at it, being that young with that many followers, there’s like an immense pressure of performing.”

After his ambitions for the channel fell apart, van Lamsweerde began editing videos for a local business, and now he has his own production company, Igor Productions. He says he’s “outgrown” his desire to be in the spotlight. “The thing I like about film production is that you’re not always in the spotlight—you’re behind the camera,” he says. Behind him in his flat sits a bookcase filled with electronics and two film clapperboards. He likes that “you don’t have to think of new ideas every day.”

Before the end of our call, Igor says he has a message for young people who want to be internet famous: “I feel like the people who are convinced that they can be influencers are most likely the ones who are going to become influencers. And the people who are not sure this is for them, but they want to try it, most likely aren’t going to be influencers. So maybe that’s a good question for everyone to ask themselves: Is this really something I want to do, or is it just because everyone else is doing it?”

Nathan

5 LONDON

As a three-year-old, Nathan struggled to communicate with his parents but loved to watch Ryan ToysReview. His mother, Jenny, who emigrated from Russia to England in 2012, decided to create a YouTube channel for her son to encourage him to talk. In 2017, Jenny began filming Nathan taking part in educational, family-friendly games—playing with science kits, counting numbers, and identifying colors on screen. His channel, QTiess, gained a small but consistent viewership: at its peak, Jenny says, Nathan earned 10,000 views a month.

Over FaceTime, Nathan is reluctant to communicate, burying his face in his mother’s lap. Now five, he looks up at Jenny, who’s 27, with curious eyes as she discusses life as a YouTube mom.

“We were putting up a backdrop in our house—we had to set up the table, prepare everything, and record for one to two hours to make a 15-minute video,” she says. The family also shelled out for a high-quality camera and a tripod, plus additional props: “Tons of toys were bought for this project. We started thinking it could bring us money. I think we received a check for like £100, but it’s a joke when you’re spending thousands on it.”

Nathan’s channel has now been dormant for two years. “We realized that it was becoming like a duty for him,” Jenny says. “He was coming home after nursery tired, moody, and I was saying, ‘Let’s play! Let’s do this!’ And at that moment I started feeling guilty. It’s his childhood. If he doesn’t want to do this, why do we need to force it?”

But Nathan wants to be a YouTuber again. Jenny says that when kids at school talk about YouTube, Nathan proudly says he has his own channel. She and her husband are now building a studio at the back of their house where Nathan and his younger sister hope to start filming.

For Jenny—who preserves flowers for a living, but also studied architecture and interior design—the videos are a creative outlet and a chance to spend time with her kids. Her husband hopes the children will be able to make money from their videos, and she hopes the experience will help them later in life.

“I would say if they can get into media, it will be easier for them in life. It’s less about money-making on YouTube but if they can be recognized by somebody in the future,” she says, noting that Nathan was offered modeling opportunities (which she turned down). “Now they’re a little bit grown up, it would be their choice if they wanted to do this, whereas then it would be my choice, and I didn’t want to force it.”
I think we received a check for like £100, but it’s a joke when you’re spending thousands on it."
Not all those who wonder are lost

When I was 10, I was a lonely, geeky girl, a first-generation Latina growing up in a small town in Indiana. I happened across J.R.R. Tolkien’s fantasy trilogy, *The Lord of the Rings*, and immediately became enraptured by the richly woven world of elves, orcs, and small but heroic hobbits fighting against impossible odds to combat a powerful enemy.

But one thing disturbed me: the lack of female characters. The main party of adventurers accompanying the hobbit protagonist, Frodo, didn’t contain a single female. Not only did I feel shut out—the way I sometimes did in school when my teachers told me that girls weren’t supposed to be good at math—but it offended my sense of fairness. Surely girls and women could have adventures and take on risky challenges too?

So I sat down with a spiral notebook and rewrote the story, re-gendering a couple of the main characters and adding new scenes, such as one where a female hobbit devised a clever plan to foil the Balrog, a gruesome monster who threw one of my favorite characters, the wizard Gandalf, into a bottomless pit.
By reimagining Tolkien’s fantasy world, I was creating a place where someone like me could feel at home. Writing my story gave me comfort. It also taught me about the effort involved in creating a narrative. I never shared that spiral notebook with anyone, but if I’d been able to get constructive feedback on it, I might have learned even more about writing.

What I didn’t realize then is I was writing fan fiction—a story based on characters or settings from another’s work—and that I was not alone. Fan fiction has many literary precedents. John Milton wrote *Paradise Lost* using characters from the Bible. Shakespeare retold ancient folk stories. Today, millions of young people are writing and sharing fan fiction on a variety of websites. They are giving and receiving feedback and teaching each other how to write. They’re not only learning about writing; they’re finding community, establishing identity, and exploring new trends that have not yet found mainstream acceptance.

On the basis of our research, my colleague Katie Davis and I at the University of Washington believe fan fiction could be more than just a source of support and self-expression for lonely kids; it could also be an important tool in formal education.

**DEFYING THE STEREOTYPE**

In the past 20 years, over 60 billion words of fan fiction have been written and posted on Fanfiction.net, the world’s largest repository. The site’s 10 million members have collectively authored a corpus about three-quarters the size of the entirety of published English-language fiction. This outpouring of creativity has been generated primarily by young people, with a median age of 15½.

Katie and I have been studying these sites since 2013, when we first met and chatted about a recent news story claiming that young people today can’t write—all they can do is produce broken, misspelled short texts. Both of us had teenage relatives who defied this stereotype. The young people we knew were skilled

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*I never shared that spiral notebook with anyone, but if I’d been able to get constructive feedback on it, I might have learned even more about writing.*
Adolescence

writers and thoughtful readers. They were also heavily involved in online communities and fan fiction. This apparent contradiction, backed up by my childhood experience, struck us as fertile grounds for research.

We recruited four students to join us in the project. Our group started out by selecting three fandoms, representing a range of genres and media types: one book, one cartoon, and one TV show. For the book, we selected *Harry Potter*, the popular young adult fantasy series, in part because it’s probably the single most prolific generator of fan fiction today, with over 800,000 stories archived in one repository alone. We also decided to study *My Little Pony: Friendship Is Magic*, a children’s animated fantasy TV series, and *Doctor Who*, a science fiction TV show that’s been running since 1963. For each fandom, it was important that at least two of us were deeply familiar with it, and that it was popular enough to have plenty of material for us to study.

We started out by reading stories and interacting with authors, and we each wrote and posted our own fanfic stories as participant observers. On our profiles we explained that we were researchers as well as fans of the communities we studied. As a group, we spent about 10 to 20 hours per week immersed in these communities. We ended up with over 1,000 hours of participant observation and several hundred pages of field notes and memos. We also interviewed authors both formally and informally.

The overriding reason that authors wrote fan fiction, we found, was for the love of it. They unanimously believed that it had helped them to become better writers, an evolution we could see for ourselves. They were very clear that support from other members of the community was critical. As one anonymous author told us:

> When I was 13, I had a major crush on a certain fictional character. My fics were full of phrases such as “gorgeous cerulean orbs,” “manly hunks of muscle,” and the like. Reviewers were kind enough to be positive about my amateurish fangirl postings—mostly because they also liked this character—but also pointed out my uses of clichés and overwriting. As a result, I learned to be sensitive to these types of bad writing. Today, I’ve published original fiction, and no one has ever called me out on a florid writing style. I think if a teacher had simply red-penciled my childish scribbles, I might have been so discouraged as to never write again.

Although privacy concerns prevent us from directly quoting from the stories written by the authors we interviewed, a well-known example illustrates how bad fan fiction can be. *My Immortal*, called by some “the worst fan fiction ever written” (it may or may not be a parody), is a *Harry Potter* fanfic posted in 2006 on Fanfiction.net:

> Hi my name is Ebony Dark’ness Dementia Raven Way and I have long ebony black hair (that’s how I got my name) with purple streaks and red tips that reaches my mid-back and icy blue eyes like limpid tears … I’m a vampire but my teeth are straight and white. I have pale white skin. I’m also a witch.

Many of the authors we interviewed admitted they started off as poor writers but said they’d improved enough to consider writing professionally.
We found that not only were fan fiction authors writing original fiction; they also learned life lessons, becoming more tolerant and willing to help others. Some said they’d become more open-minded, and had received emotional support that helped them navigate adolescent traumas and find identity. Here’s what three of them said:

“When I started writing fan fiction at age 13, I was a queer, autistic middle schooler who had not yet realized that she was either of these things. I had difficulty with many of the social situations that came naturally to others my age, and I became isolated from my peers at school. Fan fiction communities were a vital social outlet for me. I spent over a year heavily invested in writing and reading fan fiction, and accomplished some things I’m still quite proud of. That definitely had an impact on who I am. I’m more willing and able to help other writers with their work, I’m less judgmental about fan fiction and a number of other things, and I’ve certainly learnt a lot about grammar!”

“It’s been a massive confidence boost that helped me get through university without quitting and still helps me today if I’m feeling down.

Our research goal was to learn more about fanfic authors’ mentoring relationships. We expected to find traditional mentorship pairs, with an older or more experienced author serving as a beta reader for a younger or less experienced one.

What we found was different. Millions of authors and readers communicate via multiple channels—including Skype, official beta reader groups, fan fiction user groups, and other messaging and social-media platforms, as well as story reviews. Individual pieces of feedback are often too small to constitute mentoring on their own, but in the aggregate, particularly when reviewers build on and reference each other’s comments, the result is a new form of network-enabled mentoring that we call “distributed mentoring.” It enables authors to piece together an overall view of their writing that is supportive as well as constructive. Many authors feel encouraged as well as educated by their reviewers. As one young person told us:

“I’ll just add to the mentoring point—it’s sort of come full cycle for me. When the girl PM’d [private messaged] me asking for advice, I did realize that I used to be her. Back in the day I wrote so badly that people flaming and trolling me would’ve been perfectly viable. Luckily I had people to push me up and advise me to turn me into the author I am today, so I found it really important to do exactly the same for her.

One key attribute of distributed mentoring is its abundance. Authors who have written both traditionally published work and fan fiction have noted that they may get more feedback in a week on their fanfics than they receive in years on their original fiction. It is a difference not only of degree, but also of kind. By itself, a single comment on a story, such as “Loved it,” is relatively meaningless. However, if a writer receives dozens or hundreds of similar comments, it’s valuable guidance.

“I think if a teacher had simply red-penciled my childish scribbles, I might have been so discouraged as to never write again.”

We believe distributed mentoring could be used to help improve formal writing education in schools. The most recent report from the National Assessment of Educational Progress indicated that 73% of US students in grades 8 and 12 lack proficiency in writing. Research has shown that writing skills can improve significantly during adolescence, and the popularity of writing fan fiction in that age group shows what an opportunity there is to use it as a learning tool.

Students with similar interests from school districts across the country could be connected with one another to get and give anonymous or pseudonymous feedback on their writing. Teachers could moderate the channels to ensure that feedback was constructive, as well as helping students learn from it.

If this work grew burdensome for teachers, hierarchical moderation could help. In other words, members could report negative or abusive comments, and volunteer moderators from among the students could decide which ones to delete, with teachers weighing in only when necessary. This technique is used in many large online communities, and many adolescents are familiar with it.

This vast and vibrant resource for kids who have something to say is especially meaningful to me when I contrast it with the isolation I encountered growing up. Fan fiction is a private universe that has become a welcoming community, particularly for those from marginalized groups. In it, young people are mentoring each other to become skillful writers and thoughtful readers—and they are doing it entirely on their own time and their own terms. Adults would do well to listen to and learn from them.

Quotes from Writers in the Secret Garden: Fanfiction, Youth, and New Forms of Mentoring by Cecilia Azagon and Katie Davis (MIT Press, 2019). Used with permission. Jessica Madorran is an artist based in Dallas. Her fan art includes a series depicting Disney princesses who’ve been reimagined as warriors.
Play AI bingo with your teach them the

By KAREN HAO
Illustrated by Tomi Um

ABOUT THIS GAME
Artificial intelligence is all around us. But we often don’t notice how much it’s incorporated into the different aspects of our lives. This game challenges you and your kid(s) to notice. Designed by Blakeley H. Payne, a researcher at MIT, AI bingo builds on pedagogical research that shows how exposing kids to the way technology works helps develop their interest in STEM and improve their job prospects later on in life. It is also part of a broader curriculum designed for and tested by students from 9 to 14. The full curriculum can be found at http://technologyreview.com/middle-school-ai.

AI IS MADE OF THREE PARTS: A DATA SET, A LEARNING ALGORITHM, AND A PREDICTION

A DATA SET is a collection of curated data. It doesn’t have to be just numbers! It can be images, amounts of time, numbers of YouTube views, all the texts and emojis you’ve ever sent, or even video and audio recordings. All of these contain valuable information about how people—and the world around them—behave.

An ALGORITHM is a set of instructions that turns something (an input) into another thing (an output). A sandwich-making algorithm, for example, would turn a bunch of ingredients (bread, peanut butter, and jelly) into a delicious lunch (a PB&J sandwich).

The AIs we use daily are learning algorithms. They “learn” to write their own instructions for turning inputs into outputs—but first they need a teacher. An email spam filter, for example, learns to identify spam by looking at lots and lots of examples. Then it can PREDICT, when shown a new email, whether it’s spam or not.
INSTRUCTIONS FOR KIDS: It’s time to play AI bingo!

1. With your friends, form two teams of 1–2 people.

2. Each bingo tile will contain something you do in your life that uses an AI system. Your job is to figure out what data sets the AI would need and what predictions it would make. As an adult reads off the list of data sets and predictions one by one, try your best to work out where they belong.

3. Use a pencil to fill in the tile. The first team to fill in five squares with the correct data set and prediction in a row, diagonal, or column wins.
## BINGO TEAM 1

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<tr>
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### INSTRUCTIONS FOR ADULTS

Below is a list of tasks, with the data set and prediction that goes with each task. Read out a data set or a prediction at random (but not the task itself!) and have the players fill it in next to the task they think it belongs to until one of the two teams correctly fills out five tiles in a row, diagonal, or column.

**Data sets & predictions**

**TASK:** Get a forecast from a weather app  
DATA SET: what the weather was like in the past  
PREDICTION: what the weather will be like in the future

**T:** Send a voice-to-text message  
DATA SET: transcription of your audio message  
**D:** transcribed audio of people talking  
**P:** a response you might give to a new email

**T:** Search for something on Google  
DATA SET: past links you’ve clicked on in Google  
**D:** past searches of people who share your interests  
**P:** your full search after you type the first word

**T:** Have Google autocomplete your search query  
DATA SET: past searches of people who share your interests  
**D:** past searches of people who share your interests  
**P:** your full search after you type the first word

**T:** Have a writing assignment graded by a computer  
DATA SET: examples of graded writing assignments  
**D:** examples of graded writing assignments  
**P:** the grade a new assignment deserves

**T:** Use “safe search” on Google  
DATA SET: examples of websites that are safe and unsafe  
**D:** examples of websites that are safe and unsafe  
**P:** the best emoji to replace what you’ve texted

**T:** Get a suggested email response on Gmail  
DATA SET: people’s responses from past email exchanges  
**D:** people’s responses from past email exchanges  
**P:** a response you might give to a new email

**T:** Use a Snapchat filter  
DATA SET: examples of people’s faces  
**D:** examples of people’s faces  
**P:** where to paste glasses on your face

**T:** Play a motion-sensitive video game on Nintendo or Wii  
DATA SET: examples of different motions that correspond with actions in a video game  
**D:** examples of different motions that correspond with actions in a video game  
**P:** the action you’re trying to take when you make a motion

**T:** Replace letters, like “lol,” with a suggested emoji  
DATA SET: what each emoji could mean  
**D:** what each emoji could mean  
**P:** the best emoji to replace what you’ve texted
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**Tasks:**
- **Receive a product recommendation on Amazon**
  - Description: the products people have bought together in the past
  - Prediction: a product you might like with what you just bought

- **Have an email go to your spam folder**
  - Description: examples of emails that are or aren’t spam
  - Prediction: whether a new email is spam

- **Click on an Instagram ad**
  - Description: the Instagram accounts people follow and what they buy
  - Prediction: what you might buy based on who you follow

- **Have a news app suggest an article**
  - Description: the news articles you’ve read in the past
  - Prediction: the news articles you may like to read

- **See a suggested ad on Snapchat**
  - Description: the Snapchat accounts people follow and what they buy
  - Prediction: what you might buy based on who you follow

**T-Do List:**
- **Have your words autocorrected in a text**
  - Description: examples of how people misspell words
  - Prediction: the word you’re trying to spell

- **Listen to a recommended song on Spotify**
  - Description: past songs that you’ve listened to
  - Prediction: new songs you may like

- **See a recommended product on Facebook**
  - Description: the Facebook posts people engage with and what they buy
  - Prediction: what you might buy based on posts you engage with

- **Get “nudged” to respond to an email on Gmail**
  - Description: how quickly people have responded to emails in the past
  - Prediction: how quickly you should respond to an email

- **Use your face to unlock a device**
  - Description: images of your face
  - Prediction: whether a face is yours

- **Use a map app to find a path to a destination**
  - Description: how long it historically takes to get from point A to B
  - Prediction: the shortest commute from point A to B

- **Use an app like Shazam to identify a song**
  - Description: examples of what songs sound like in noisy environments
  - Prediction: the name of a song playing in a noisy environment

- **Communicate with a customer service bot**
  - Description: the most helpful answers to past customer questions
  - Prediction: the best answer to your question

- **Have an email labeled as “important”**
  - Description: examples of emails that are or aren’t important
  - Prediction: whether a new email is important
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Adulthood?

After four decades we still don’t know for sure whether video-game addiction is real. Colleges are rushing to install voice assistants, but at what cost to students’ privacy? See what happens when young people give up their phones, or never get them in the first place. And why the incessant documentation of young people’s lives could trap them in their youthful mistakes.
IN THE BIRTHPLACE OF E-SPORTS,

By MAX S. KIM
Illustration by Erik Carter
THE DEBATE OVER WHETHER VIDEO GAMES CAN BE ADDICTIVE IS AS FIERCE AS EVER.
hey say StarCraft was the game that changed everything. There had been other hits before, from Tetris and Super Mario Bros to Diablo, but when the American entertainment company Blizzard released its real-time science fiction strategy game in 1998, it wasn’t just a hit—it was an awakening.

Back then, South Korea was seen as more of a technological backwater than a major market. Blizzard hadn’t even bothered to localize the game into Korean. Despite this, StarCraft—where players fight each other with armies of warring galactic species—was a runaway success. Out of 11 million copies sold worldwide, 4.5 million were in South Korea. National media crowned it the “game of the people.”

The game was so popular that it triggered another boom: “PC bangs,” pay-as-you-go gaming cafes stocked with food and drinks where users could entertain themselves for less than a dollar an hour. As old-world youth haunts like billiard halls and comic-book stores disappeared, PC bangs took their place, feeding the growing appetite for StarCraft. In 1998 there were just 100 PC bangs around the country; by 2001 that had multiplied to 23,000. Economists dubbed the phenomenon “Starcnomics.”

“PC bangs were really the only place where people could relieve their stress,” says Edgar Choi, a former teenage StarCraft wunderkind who went on to become one of the first professional gamers.

Now 35, and still involved in pro gaming, Choi says that StarCraft and PC bang culture spoke to a generation of young South Koreans boxed in by economic anxiety and rising academic pressures. “Young people especially had few other places they could go, especially since parents would just tell them to study if they were at home,” he says.

The social aspect of StarCraft set the stage for another phenomenon: e-sports. PC bangs began hosting the first StarCraft competitions—informal neighborhood affairs where prizes were free playing time and bragging rights. After one cartoon channel broadcast a tournament on TV to popular acclaim in 1999, organized competitions took over. By 2004, one finals match held on Busan’s Gwangalli Beach attracted more than 100,000 spectators.

Crowds like that drew money and fame. Corporate sponsorships flowed from companies like Samsung, which created branded professional teams paying big salaries. Lim Yo-hwan, the Michael Jordan of StarCraft, was a household name whose public profile surpassed that of pop artists and movie stars. Choi, a self-described “midlevel player,” says even today he is occasionally recognized by taxi drivers who used to watch him on TV.

Beyond gaming circles, however, an unease had begun to sink in.

Just outside Seoul, at a hospital in the nearby city of Uijeongbu, psychiatrist Lee Hae-kook witnessed StarCraft mania unfold. But his eyes weren’t on its popularity. He was looking at a pattern of medical incidents involving computer games.

Some of the reports came from other countries, like Japan, China, and Germany, but the most disturbing incidents were local. In October 2002, an unemployed 24-year-old man died in a PC bang in the southwestern city of Gwangju after playing for 86 hours straight. It was the world’s first reported case of death by gaming. In 2005, a 28-year-old man in the southwestern city of Daegu had a heart attack in his seat after...
a 50-hour StarCraft binge. Another death occurred just months later in Incheon, at the opposite end of the country.

"Young people were gaming to the point where their normal functions were falling apart, and people started coming to the hospital seeking treatment," says Lee, who works at the Catholic University of Korea’s St. Mary’s Hospital. He wondered if he was looking at something more than just a fad. Was this a new category of addiction?

In 2002, an unemployed 24-year-old man died after playing for 86 hours straight. It was the world’s first reported case of death by gaming.

Others, including the government, were asking the same question. In 2002, another psychiatrist estimated that 20% to 40% of South Korean adolescents exhibited signs of addiction to gaming, such as aggression toward their parents or an inability to manage time; he started hospitalizing his patients. In 2005, the government in Seoul began opening internet and gaming addiction detox camps where children and teenagers were given counseling in peaceful wilderness retreats.

Games, Lee perceived, were also becoming far more immersive, with elements designed to “make the user stay as long as possible." In 1998 the South Korean gaming company Nexon had invented the “free-to-play” business model, in which games are technically free but require constant cash infusions for the player to meaningfully progress. Since then, companies had been churning out games that enticed users to spend money in ways that seemed to resemble gambling. That explained something else Lee had noticed: the debt his patients were racking up.

By 2011, Lee was convinced that gaming addiction was real and diagnosable, and that it was hindering children’s academic performance and sleep. That same year, as national panic mounted, the government proposed the Shutdown Law, a curfew that would block access to online games for those under 16 between midnight and 6 a.m. In a government-commissioned study outlining the policy’s benefits, Lee argued that gaming addiction had inflicted “mass trauma" on the nation and was to blame for suicides and homicides. The law passed by a large majority and is still in effect today.

The following year, Lee joined forces with a newly minted lawmaker named Shin Eui-jin, who had put gaming addiction at the top of her agenda. A former child psychiatrist, Shin was preparing a so-called “addiction bill” that aimed to regulate what fellow lawmakers called the four evils of South Korean society: gambling, alcohol, drugs … and video games. Gaming addiction, Shin claimed, was responsible for schoolyard bullying and violent crime. At a 2014 parliamentary hearing, Lee told lawmakers that gaming might be “an even stronger addiction than drugs,” and when asked whether he would be open to removing it from the list of addictions, he said, “I’d sooner take out drugs." (Lee now insists the comment was taken out of context: “What I meant was that we need a legal support system to prevent and treat a problem that’s far more prevalent than drug use.”)

But whereas the Shutdown Law had passed easily enough, Shin’s bill quickly became bogged down in controversy. While medical experts like Lee said gaming addiction was real, others claimed there was no conclusive evidence that video games were inherently addictive. Critics skewered the bill and said Lee’s comments were a witch hunt. When the legislation failed to pass, it seemed the debate had reached an impasse—until it was recently reignited by an unlikely source.
When StarCraft arrived on the scene, the Asian financial crisis of 1997 had just leveled South Korea’s finances, causing mass unemployment and unrest. The International Monetary Fund bailed out the government in Seoul to the tune of $58 billion, an unprecedented sum at the time, but only in exchange for an agreement to completely overhaul the nation’s economy. The following year, acting on advice from Bill Gates and Softbank’s Masayoshi Son, the South Korean government launched aggressive programs to revive the economy by building up internet infrastructure and making computers accessible to the public.

By 2002, 10.4 million households had high-speed internet—a 700-fold increase from 14,000 in 1998. Catalyzed by broadband, StarCraft moved into people’s homes and into PC bangs, where it provided a welcome refuge for teens feeling the crush of the post-crisis years. Local competitions made the game important to many communities, as well as giving teenagers a safe release valve for the competitive feelings generated by the country’s high-pressure academic environment.

In 1999, a young StarCraft-smitten TV producer came up with the idea of televising a match on a local channel, Tooniverse—the first televised e-sports tournament in the world. Filmed on dusted-off ping-pong tables in an unused studio for $300, it became a hit, and tournaments grew in scale and number. StarCraft cemented itself as a spectator sport to be reckoned with. When game sales in South Korea reached the 2 million mark in 2002, Blizzard founder and then-CEO Mike Morhaime made a pilgrimage to Seoul, where he saw his first live e-sports match and lead programmer Bob Fitch got a standing ovation.

The varied and lasting cultural legacy of StarCraft can be felt even today. Game lingo from the era lives on in contemporary youth slang, and it is a touchstone for Generation X nostalgia. When Blizzard released a remastered edition of the game in 2017, it inspired “salarymen StarCraft tournaments” and throwback live events. And even after 20 years, the game still maintains a respectable seventh place on the PC bang most-played list.

On May 25, 2019, in Geneva, Switzerland, members of the 72nd assembly of the World Health Organization unanimously voted to pass the 11th revision of the International Classification of Diseases, the WHO’s official catalogue of illnesses. Among the revisions is the addition of “gaming disorder,” defined as “a pattern of persistent or recurrent gaming behavior” accompanied by a loss of control and functional impairment. It is only the second globally recognized behavioral addiction; the first was gambling, which was approved in the last revision of the ICD in 1990.

ICD-II, which goes into effect in 2022, adds thousands of new codes to more accurately capture specific injuries and diseases, as well as correcting historical mistakes. Strokes, for example, will now be classified as a neurological problem rather than a circulatory one; “gender identity disorder” is now “gender incongruence” and is no longer classified as a mental disorder.

Adding gaming disorder to the official medical lexicon marks a significant shift. Despite the years of concern and study about the effects of video games, conclusive evidence of any links to addiction or violence has been hard to come by. For many, the idea that somebody can be clinically addicted to behaviors—rather than to substances like alcohol or opioids—remains controversial. Others think the definition of gaming addiction in particular is too woolly to be useful.

“We’ve had 30-plus years of research on gaming addiction and we’re not really anywhere closer to understanding what it is that we’re actually talking about,” behavioral researcher Pete Etchells recently told MIT Technology Review.

For people like Lee, the psychiatrist, the decision is a vindication. The grounding for the WHO’s decision came out of talks among an advisory group of mental health researchers that he had been invited to join in 2014. Reports from the group’s annual meetings, which were held from 2014 to 2017, noted “the wide-ranging perceived benefits of increased government
prevention” in South Korea, as well as “significant developments” in prevention, treatment, and research.

Yet some have disputed the caliber of the South Korean work. According to a recent meta-study, 91 of the 614 papers on gaming addiction published internationally from 2013 to 2017 were from that country, making it the single largest contributor by volume. The study’s author, Yonsei University media studies professor Yoon Tae-jin, argues that many of those studies are overly broad, treating gaming as a single category and failing to distinguish specific games or genres. Most of the research, according to Yoon, suffers from a confirmatory approach: assuming that gaming addiction is real from the outset, rather than trying to prove it scientifically.

There have also been suggestions that Asian countries like South Korea—which are generally more sensitive about gaming addiction than their Western counterparts—leaned on the WHO to include gaming disorder in ICD-11. In August 2016, an American clinical psychologist, Christopher Ferguson, emailed the WHO to advise against the inclusion. “It’s probably not an issue that’s quite ready for prime time,” he wrote. One of the email’s recipients, ICD-11 project officer Geoffrey Reed, replied: “Not everything is up to me. We have been under enormous pressure, especially from Asian countries, to include this.” (In an email to me, Vladimir Poznyak, coordinator of the WHO substance abuse department, denied that political pressure had influenced ICD-11.)

Surprisingly, the WHO decision has reopened, rather than settled, the bitter debate. Even government agencies have openly feuded; the South Korean culture ministry refused to join a consultative body led by the health ministry last May, effectively stonewalling early moves to implement the classification. The rift has prompted Prime Minister Lee Nak-yeon to create a separate arbitration committee to decide whether South Korea will adopt ICD-11’s recommendations in the coming years.

And in the numerous parliamentary forums, televised debates, and academic symposia convened in the wake of the WHO decision, the same question looms large: Has a culture of intensive gaming really brought about a public health crisis?

When I met him at his office in September, Lee Hae-kook was on edge. Now 50 years old, the psychiatrist is slender and wan, with a haughty and impolite manner that seems unsuited to public campaigning. His views, at the center of renewed attention following the WHO decision, have made him public enemy no. 1 in the gaming community, where he is widely seen as the architect of a moralistic vendetta.

He began our meeting by railing against “fake news” propagated by gaming journalists to distort his views and obscure an obvious public health crisis. “Debating whether it should be a disease code or not is a meaningless waste of time,” he said. The medical authorities had spoken, so what else was there to say?

To illustrate the dangers of gaming addiction, Lee told me the story of one of his recent patients: a 25-year-old unemployed man who was dragged in by his older sister after racking up around $18,000 in debt from in-game purchases. The patient had spent his adolescent years gaming for two to three hours a day, with little interest in schoolwork. As an adult, Lee said, “he spent 10 hours a day online, five playing games and five watching YouTube videos.”

The patient seemed to be a textbook case of gaming disorder under the WHO’s criteria: loss of control, gaming displacing other aspects of life, and functional impairment. So when I asked Lee about the treatment, I expected to hear about some novel form of therapy.

“This person eventually fit the criteria for adult ADHD, so we began administering ADHD medication,” he said instead.
“He also exhibited temporary symptoms of depression, so his condition was partially improved by the use of antidepressants.”

When I asked what made this a “gaming disorder” diagnosis, as opposed to just ADHD and depression, Lee replied that “gaming a lot can cause ADHD-like impulsivity.”

The conversation epitomizes one of the central disagreements hanging over the WHO’s decision: Is excessive gaming truly a unique disorder, or is it simply a manifestation of other conditions? Current research confirms that patients with gaming disorder are more likely to have ADHD and depression, but neurologists and psychiatrists who dispute Lee’s claim emphasize that correlation does not equal causation.

In 2018, after quitting his job with one of South Korea’s biggest game companies, 41-year-old Kim began working full time on his gaming-themed YouTube channel, where he has been chronicling the controversy over gaming disorder in angry tirades for 336,000 subscribers.

While he is critical of companies that make what he calls “slot machines in disguise”—the types of games where users can rack up $18,000 worth of debt—Kim also wonders whether doctors can make sound diagnoses if the research fails to distinguish gambling-like titles from those that require creative problem-solving.

“The psychological effects of certain games and genres are far more complex than something like alcohol,” he says. “But to try to judge gaming addiction without even differentiating type or genre? It’s ridiculous.”

Kim sees the push to pathologize games as a tyranny of the old against the young, rooted in authoritarian attitudes. He recounts a recent scandal at an orphanage, where caretakers dosed unruly children with ADHD medication obtained from doctors under pretexts like “smartphone immersion.” Could the same happen with gaming disorder? Kim believes so. “It sounds like what these doctors consider gaming addiction treatment is just neutering basic human urges,” he says. One core criterion for the WHO diagnosis, functional impairment, strikes him as particularly vulnerable to abuse: “To me, what that’s saying is that it’s also acceptable to medicate kids underperforming academically.”

Most of all, he wants the debate to lead to a wider conversation about the experiences of young people in the country. He cites recent research linking problematic gaming in South Korean adolescents to overbearing parenting and academic stress. The implication is that in focusing on games and the people who play them, the concept of gaming disorder papers over the dysfunctions of a society shaped by adults.

Indeed, while South Korea has grown into one of Asia’s strongest economies, that has not translated into broader cultural or social enrichment for the country’s youth. Rather, young people in South Korea’s punishing education system are killing themselves at historically high rates. “Pushed up against relentless competition,” one lawmaker has said, “our children are gradually losing anywhere to go.” Even...
Lee Hae-kook acknowledges that gaming is one of the few sources of pleasure and recreation available to South Korean youngsters. It’s a grim realization, and just about the only thing on which Lee and his opponents agree.

Whatever image problems the gaming industry has developed, its sheer position in popular culture has made it impossible to ignore. The global gaming market is projected to reach $152 billion in 2019, and there are now 2.5 billion gamers across the world. E-sports alone are valued at more than $1 billion, a figure expected to double by 2022, and are now gunning for a spot at the Olympics. As a UK proponent has argued, they are “the first world sport outside of football that is truly global.”

This was never more apparent than when I met Edgar Choi, the former StarCraft pro, on a sunny day in September. These days he is employed as a head coach at Gen G, a South Korean e-sports organization worth an estimated $110 million. Inside its headquarters, a brutalist-chic multistory concrete building in Seoul’s affluent Gangnam district, Choi trains players in a game called League of Legends—this generation’s StarCraft.

The facilities’ careless luxury and startup-campus cool are a testament to the industry’s remarkable expansion since the early days of pro gaming. Gen G recently received $46 million in funding from Silicon Valley venture capital firms and celebrities like Will Smith. Two-time NBA champion Chris Bosh is the “player management advisor.” There are a massage room, a napping room, basement studios for streamers, a buffet-style cafeteria tended to by aproned lunch ladies, two more headquarters in Los Angeles and Shanghai, and aisle upon aisle of sleek black gaming computers in classrooms throughout the building.

Professional gaming has become one of the most coveted career paths among South Korean youth, and these classrooms are where Gen G develops future prospects. “Only about 10% of trainees will become pro,” said Choi. Things are far more competitive and regimented than they were in his time; gamers can no longer afford to just play for fun. “Back then, I couldn’t even imagine that it would become like this,” he said.

On a row of computers in the employee lounge, three of the team’s marketers played games on their break. Expensive whiskies and gleaming silver trophies were displayed in cases on the walls.

To Choi, who lives in a world where gaming has evolved into a form of work rather than play, the idea of gaming addiction feels anachronistic. He wants to steer his two young children away from the hyper-competitive world of e-sports and has been careful to instill healthy personal gaming habits in them. For the most part, though, he is less worried about games than smartphones. Kids, he says, are mostly on their phones, watching YouTube, going on social media, and reading webtoons as well as playing “free to play” games. With the WHO already behind gaming disorder, there is now talk of government regulation specifically aimed at smartphone use. Perhaps the StarCraft generation, now parents themselves, have found their own bogeyman.

The latest Diagnostic and Statistical Manual of Mental Disorders does not add gaming addiction to the medical textbooks. But it does list “internet gaming disorder” as a “condition for further study.” Studies by scientists at Oxford, Villanova, and Dartmouth come to varying and sometimes contradictory conclusions, including that games can:

- have a calming effect
- reduce aggressive behavior
- increase aggression and that aggression is linked to the game mechanics rather than in-game violence.

The American Psychological Association states that violent video games can marginally increase aggressive behavior, but finds little evidence of a link to crime. A study in the Journal of Experimental Social Psychology finds that violent video games did not change how aggressive players felt.

The WHO votes to add “gaming disorder” to the upcoming revision of the International Classification of Diseases.
HALL MONITOR

Colleges are installing smart speakers like Alexa in dorm rooms and hallways. Students may love the convenience—but are they at risk?

By Kathryn Miles
When Mateo Catano returned for his second year as an undergraduate at Saint Louis University in the fall of 2018, he found himself with a new roommate—not another student but a disembodied brain in the form of an Amazon Echo Dot.

Earlier that summer, the information technology department at SLU had installed about 2,300 of the smart speakers—one for each of the university’s residence hall rooms, making the school the first in the country to do so. Each device was pre-programmed with answers to about 130 SLU-specific questions, ranging from library hours to the location of the registrar’s office (the school dubbed this “AskSLU”). The devices also included the basic voice “skills” available on other Dots, including alarms and reminders, general information, and the ability to stream music.

For Catano, the Dot was a welcome addition. He liked hearing the weather first thing in the morning and knowing which dining halls were open. And, if he’s being honest, he liked the company. “Living in a single, AskSLU definitely made me feel less lonely,” he says. “And I liked the status of being at the first university to do this.”

Catano’s reaction was exactly what SLU administrators were hoping for. This fall, the Jesuit institution announced plans to broaden the voice skills of its Echo Dots by including both text messaging and chatbot functions.
We’re on the verge of a new era of smart speakers on campus. Schools as wide-ranging as Arizona State University, Lancaster University in the UK, and Ross University School of Medicine in Barbados have adopted voice-skill technology on campus. Some, including Northeastern University, have taken the technology a step further and now give students access to financials, course schedules and grades, and outstanding fees via voice devices.

In late 2018, Boston’s Emerson College announced it was one of 18 recipients of a grant from Amazon to advance voice-enabled technology on campuses, part of the tech giant’s Alexa Innovation Fellowship. Emerson has created a dedicated voice lab where students can interact and experiment with Alexa skills, and it plans to install Alexa devices in places like theaters and outside elevator banks.

Administrators at some of these schools told me they believe Alexa will bolster enrollment and reduce dropout rates. Several also said they believe voice technology can increase their students’ success and boost their overall happiness.

However, there are plenty of people on campus who see a dark side.

“When it comes to deploying listening devices where sensitive conversations occur, we simply have no idea what long-term effect having conversations recorded and kept by Amazon might have on their futures—even, quite possibly, on their health and well-being,” says Russell Newman, an Emerson professor who researches the political economy of communication and communications policy.

Other faculty members I spoke to echoed Newman’s objections. What if data harvested from students’ conversations affected their chances of getting a mortgage or a job later on? What if it were used against foreign students to have them deported, possibly to home countries where they could be imprisoned for their political views?

Right. So given all the risks, why are colleges so eager to fill their campuses with AI-enabled microphones? What’s it for them?

Colleges and universities face several looming crises. After years of soaring enrollment numbers, US schools are seeing declines in admissions, a trend expected to worsen over the next decade. A November 2019 special report by the Chronicle of Higher Education predicts rapid decreases at even the country’s most selective institutions. Institutional revenue has stalled—Moody’s Investors Service issued a negative outlook for higher education for fiscal year 2019, with the exception of universities in the South. For three years, the Department of Education has sought to slash billions from financial aid and support for poorer students, though Congress has rejected the cuts. State contributions to public university budgets have lagged since the last recession.

Private colleges are also struggling; more than a quarter of them are now in the red. In recent years, 20 private, nonprofit colleges closed their doors, and many more are considering merging or consolidating.

Meanwhile, half of all students who enter college fail to graduate within six years. Researchers give a variety of explanations. Nick Bowman, a professor of education at the University of Iowa, points to the fact that today’s students are older than the traditional 18- to 22-year-olds. Many have full-time jobs. Some care for children or siblings or aging parents. And with an average of $35,000 in student loan debt after four years in school, the prospect of dropping out can be tempting.

For many college administrators, AI offers appealing solutions to these predicaments. Winston-Salem State University, a historically black university with many low-income and first-generation college students, has had perennial problems helping each entering class hit key deadlines like submitting high school transcripts and vaccination records, completing financial aid forms, and making housing deposits. “We realized that many of our students may not understand the college enrollment process and may not be able to rely on families or support systems to decode it for them,” says Jay Davis, the university’s head of media relations.

Two years ago, WSSU partnered with a tech firm called AdmitHub to offer an AI chatbot named Winston to help students navigate the enrollment process. Davis says the app successfully answers about three-quarters of students’ questions, and that there’s been a dramatic increase in the number of students who meet their financial requirements and submit all the supporting documents necessary to complete their application. This year WSSU is hosting its largest first-year class in more than a decade, and Davis says Winston played a big role in that.

I spent several hours playing around with chatbots at a handful of colleges and universities. They all aced questions about the school mascot, where I could find dinner, and when the next sporting or alumni networking event was. But they flubbed others. When I told one I was sick, it informed me the student health center would not issue...

“We still don’t really know just how much data voice-skill hosts like Amazon—or third parties that rely on Amazon—are harvesting, or what they’re doing with that information.”
a written excuse for missed classes. I asked it where the student health center was; it responded with university tour times for prospective students. I told another I felt depressed, and it referred me to a federal student financial aid program.

The campus programmers on the other side of these devices all told me that the skills would improve as more students used them—which is, of course, what makes AI so effective. But it’s also what makes threats to our privacy so real, says Vitaly Shmatikov, a professor of computer science at Cornell Tech. Tech companies, says Shmatikov, are notoriously opaque about privacy and security. What he and other scholars have learned about them is largely by way of reverse-engineering and some educated guesswork, and the findings concern Shmatikov a great deal.

For starters, he says, companies like Amazon train their speech recognition algorithms on recordings of past user interactions to make them better at, for instance, understanding the intent of a question. He says all the companies involved are “very cagey” about how much data is traveling between them. “There is no promise to the user that their data won’t leave a specific device,” says Shmatikov. “We still don’t really know just how much data voice-skill hosts like Amazon—or third parties that rely on Amazon—are harvesting, or what they’re doing with that information.” Amazon didn’t respond to multiple requests for comment.

Shmatikov says it’s reasonable to assume that a company’s cloud has date- and timestamped recordings of students’ requests to a smart speaker, and the devices may even record the conversations the student might have had with other people before or after speaking to it. As voice identification and location skills improve, it will become increasingly possible to link these recordings to an individual person. That’s not like a school searching your locker; it’s more like a school recording in perpetuity everything that’s ever been in your locker and what you and your friends said every time you opened it, and then letting a host of commercial entities search that information.

Officials at Arizona State University and Saint Louis University say they’re not linking information like students’ financials, health records, and grades (data known as “authenticated,” since it requires a student to link to personal accounts) until they are more confident about the security measures. The technology used at Northeastern was developed by a small team led by Somen Saha, then an employee at the university. Saha eventually created an independent company called n-Powered, which developed an app called MyHusky that’s available through Alexa. However, its privacy page also acknowledges, “We use Amazon’s platform to make this work. Amazon stores information about usage that can be purged upon request.”

Shmatikov says that using a university’s own software and restricting the use of chatbots to general questions may limit a tech company’s access to student information, but it won’t solve the problem entirely. He points to sensitive questions like whether the health center offers STD testing or prescriptions to treat conditions like schizophrenia: technically, these aren’t linked to a specific student, but it’s not too hard to figure out who is asking, and students may not realize these aren’t always anonymous queries. Plus, says Shmatikov, as long as a company like Amazon is converting student prompts to data signals, it has access to the student’s information—forever.

Privacy is a concern for any user of an AI device, but the faculty I spoke with for this story insist there are particularly scary ramifications for higher education.

“College students are perhaps the most desirable category of consumers,” says Emerson’s Newman. “They are the trickiest to reach and the most likely to set trends.” As a result, he says, their data is some of the most valuable and the most likely to be mined or sold. And for educational institutions to be complicit in the commodification of students for corporate gain is, he says, fundamentally antithetical to their missions.

Sarah T. Roberts, an assistant professor of information studies at UCLA, says schools that enter into agreements with tech companies are at least potentially putting their students’ well-being at risk. “A student’s time at a college or university is used to explore ideas and try on new identities, whether that’s political beliefs or gender and sexuality,” says Roberts. “The knowledge that they are being recorded as they do so will undoubtedly prevent students from feeling like they can speak their minds.” It’s also worth remembering, she says, that many students come from countries where it can be dangerous to reveal their sexuality or political beliefs.

At Northeastern, one student created an online petition demanding that the university remove all Alexa devices. It reads in part: “Alexas are well-documented as surreptitious listening devices that are used to help sharpen Amazon’s marketing tactics .... At the very least, Northeastern University is forcing an extraneous device in student spaces that no one asked for. At the worst, they are recklessly violating their student body’s privacy at the behest of a corporate donor.” As of early December, the petition had 125 signatures.

At Emerson, students and other faculty members have joined Newman in creating a committee to draft privacy policies for the campus. At the very least, he says, he would like to see warning signs placed wherever a listening device is located. He says so far the administration has been cooperative, and the deployment of any devices has been delayed.

“We need a safe way to experiment with these technologies and understand the consequences of their use instead of just continuing a blind march towards surveillance for the purpose of profit-making,” Newman says. “These are sophisticated applications with lifelong consequences for the individuals who are analyzed by them, to ends as yet unknown. We all need to be really judicious and thoughtful here.”

Kathryn Miles is a freelance writer and the author of Quakeland: On the Road to America’s Next Devastating Earthquake. Her story “The Little Coin That Ate Quebec” appeared in the May/June 2018 issue.
A few years ago, I performed an experiment in a philosophy class I was teaching. My students had failed a midterm test rather badly. I had a hunch that their pervasive use of cell phones and laptops in class was partly responsible. So I asked them what they thought had gone wrong. After a few moments of silence, a young woman put up her hand and said: “We don’t understand what the books say, sir. We don’t understand the words.” I looked around the class and saw guileless heads pensively nodding in agreement.

I extemporized a solution: I offered them extra credit if they would give me their phones for nine days and write about living without them. Twelve students—about a third of the class—took me up on the offer. What they wrote was remarkable, and remarkably consistent. These university students, given the chance to say what they felt, didn’t gracefully submit to the tech industry and its devices.

By RON SRIGLEY
Illustrations by Selman Design
The usual industry and education narrative about cell phones, social media, and digital technology generally is that they build community, foster communication, and increase efficiency, thus improving our lives. Mark Zuckerberg’s recent reformulation of Facebook’s mission statement is typical: the company aims to “give people the power to build community and bring the world closer together.”

Without their phones, most of my students initially felt lost, disoriented, frustrated, and even frightened. That seemed to support the industry narrative: look how disconnected and lonely you’ll be without our technology. But after just two weeks, the majority began to think that their cell phones were in fact limiting their relationships with other people, compromising their own lives, and somehow cutting them off from the “real” world. Here is some of what they said.

“You must be weird or something”

“Believe it or not, I had to walk up to a stranger and ask what time it was. It honestly took me a lot of guts and confidence to ask someone,” Janet wrote. (Her name, like the others here, is a pseudonym.) She describes the attitude she was up against: “Why do you need to ask me the time? Everyone has a cell phone. You must be weird or something.”

Emily went even further. Simply walking by strangers “in the hallway or when I passed them on the street” caused almost all of them to take out a phone “right before I could gain eye contact with them.”

To these young people, direct, unmediated human contact was experienced as ill-mannered at best and strange at worst. James: “One of the worst and most common things people do nowadays is pull out their cell phone and use it while in a face-to-face conversation. This action is very rude and unacceptable, but yet again, I find myself guilty of this sometimes because it is the norm.”

Emily noticed that “a lot of people used their cell phones when they felt they were in an awkward situation, for an example [sic] being at a party while no one was speaking to them.”

The price of this protection from awkward moments is the loss of
Turn on, tune in ... opt out?

Some teenagers are rarely on social media.
Andy Wright asked them why.

Sharon Hofer  
16, NEW YORK

Sharon Hofer lives in a Bruderhof community in Walden, New York. The Bruderhof, who have 23 settlements in seven countries, are Christians who live communally and use modern technology sparingly.

I've lived at a Bruderhof community my whole life. We have about 300 people and live in big apartment buildings that house up to eight families. We have a dining hall, and make all our own meals, and have lunch and suppers together. We have a garden where we grow vegetables, a farm where we raise cows, and our own meat processing plant. The grass is really green; there's lots of trees.

I go to a private school in Esopus, New York. It's a four-year high school and has no technology except for a computer lab where seniors take typing. I don't have a phone or a computer, so I'm never really online. I do my homework with a pen, paper, and calculator. I've never seen social media. If I need to look something up, like for a research paper, I ask my mom and go online with her computer, which she uses for work.

There aren't any rules about what's allowed and what's not allowed, which makes the Bruderhof different from other religious groups. There's a willingness to try new things. We don't see technology as a bad thing unless it's taking the place of real interactions and connections between people.

People do have phones here, but they don't go around looking at them the entire time. When I was in eighth grade we went to New York City for a tour and I was seeing all these people and all they do is look at their phones. That was different to see. It was just funny, because no one was talking to anyone on the streets. Here, when we walk past people we say, "Hi, how's it been?"

If I had the option of using the internet for a day, I think it would be fun to see how it works and what's all out there. I'm into sports, so maybe I'd watch a game on YouTube or look up highlights. So a day would be fine, but not much longer. I worry that I wouldn't spend any time with my family if I had constant access to the internet.

Judah Siegand  
15, TENNESSEE

Judah Siegand's parents founded Parents Who Fight, an organization that advocates for online safety for minors. He has grown up with strict limits on his technology use, but in 2018 he was one of 15 students chosen to participate in Microsoft's teen Council for Digital Good.

Growing up, my access to technology was basically nonexistent. My parents believe that if it isn't necessary, then we don't get it. We don't have a smart TV. My mom has a computer for work, but that's really all she uses it for.

There was a period in fourth grade when I really bugged my parents for a phone. In eighth grade I got a flip phone so I could coordinate my football schedule with them. There were a bunch of kids that would always come up to me and be like, "Do the flip phone thing!" I would flip it out with my thumb and put it up to my ear and they would all crack up so hard.

I finally got an iPhone 6 over the summer. I don't have any social media. I don't have any games on my phone. There's an app that allows me 30 minutes of internet access a day and has a saved search that's monitored by my mom and dad. During independent study period I finish homework and then watch a YouTube video for like 10 minutes and then never even go back on the internet the whole day. I got an Xbox last Christmas, and I can play that four hours a week.

When it comes down to it, I don't even really want social media. I feel like it invites you to have friendships solely based on followers, and it kind of turns your friends into a number. By not being on it, I stay out of the drama that starts there. I get to focus on friendships that are deeper and long-lasting. To me, a real friendship is someone that you can talk to about deep things and you don't feel like you have to impress them all the time.

When I go to college I will definitely want to have some kind of gaming system. That's how me and a lot of my friends connect. I'll probably want social media to keep in touch with my friends. Hopefully, by then I'll be able to really weigh those decisions and have learned how to balance life and online use.

human relationships, a consequence that almost all the students identified and lamented. Without his phone, James said, he found himself forced to look others in the eye and engage in conversation. Stewart put a moral spin on it. “Being forced to have [real relations with people] obviously made me a better person because each time it happened I learned how to deal with the situation better, other than sticking my face in a phone.” Ten of the 12 students said their phones were compromising their ability to have such relationships.

Virtually all the students admitted that ease of communication was one of the genuine benefits of their phones. However, eight out of 12 said they were genuinely relieved not to have to answer the usual flood of texts and social-media posts. Peter: “I have to admit, it was pretty nice without the phone all week. Didn’t have to hear the freaking thing ring or vibrate once, and didn’t feel bad not answering phone calls because there were none to ignore.”

Indeed, the language they used indicated that they experienced this activity almost as a type of harassment. “It felt so free without one and it was nice knowing no one could bother me when I didn’t want to be bothered,” wrote William. Emily said that she found herself “sleeping more peacefully after the first two nights of attempting to sleep right away when the lights got shut off.” Several students went further and claimed that communication with others was in fact easier and more efficient without their phones. Stewart: “Actually I got things done much quicker without the cell because instead of waiting for a response from someone (that you don’t even know if they read your message or not) you just called them [from a land line], either got
an answer or didn’t, and moved on to the next thing.”

Technologists assert that their instruments make us more productive. But for the students, phones had the opposite effect. “Writing a paper and not having a phone boosted productivity at least twice as much,” Elliott claimed. “You are concentrated on one task and not worrying about anything else. Studying for a test was much easier as well because I was not distracted by the phone at all.” Stewart found he could “sit down and actually focus on writing a paper.” He added, “Because I was able to give it 100% of my attention, not only was the final product better than it would have been, I was also able to complete it much quicker.”

Even Janet, who missed her phone more than most, admitted, “One positive thing that came out of not having a cell phone was that I found myself more productive and I was more apt to pay attention in class.”

Some students felt not only distracted by their phones, but morally compromised. Kate: “Having a cell phone has actually affected my personal code of morals and this scares me … I regret to admit that I have texted in class this year, something I swore to myself in high school that I would never do … I am disappointed in myself now that I see how much I have come to depend on technology … I start to wonder if it has affected who I am as a person, and then I remember that it already has.”

And James, though he says we must continue to develop our technology, said that “what many people forget is that it is vital for us not to lose our fundamental values along the way.”

Other students were worried that their cell-phone addiction was depriving them of a relationship to the world. Listen to James: “It is almost like the earth stood still and I actually looked around and cared about current events … This experiment has made many things clear to me and one thing is for sure, I am going to cut back the time I am on my cell phone substantially.”

Stewart said he began to see how things “really work” once he was without his phone: “One big thing I picked up on while doing this assignment is how much more engaged I was in the world around me … I noticed that the majority of people were disengaged … There is all this potential for conversation, interaction, and learning from one another but we’re too distracted by the screens … to partake in the real events around us.”

In parentis, loco

Some parents were pleased with their children’s phone-less selves. James said his mother “thought it was great that I did not have my phone because I paid more attention to her while she was talking.” One parent even proposed to join in the experiment.

But for some of the students, phones were a lifeline to their parents. As Karen Fingerman of the University of Texas at Austin wrote in a 2017 article in the journal Innovation in Aging, in the mid to late 20th century, “only half of [American] parents reported contact with a grown child at least once a week.” By contrast, she writes, recent studies find that “nearly all” parents of young adults were in weekly contact with their children, and over half were in daily contact by phone, by text message, or in person.

Emily wrote that without her cell phone, “I felt like I was craving some interaction from a family member. Either to keep my ass in line with the upcoming exams, or to simply let me know someone is supporting me.” Janet admitted, “The most difficult thing was defiantly [sic] not being able to talk to my mom or being able to communicate with

The city in which these students lived has one of the lowest crime rates in the world and almost no violent crime of any kind, yet they experienced a pervasive, undefined fear.
Aliza Kopans
16, MASSACHUSETTS

Aliza Kopans took a break from her public school to attend a special program that limits technology use.

Right now I’m actually at a school program up in Vermont and I’m about halfway through the semester. It’s an alternative academic space and also a working farm. We grow 70% of our own food. And one of the things that they do here is take away your phone for the first half.

I have an iPhone and I text a lot—that’s really picked up in this last year. My phone use is very minimal compared to other kids my age, but I definitely spend more time on it than I’d like. The rest of the year I go to a big public school in a suburb of Boston, and I have it during the day and sometimes in classes, but I’ll shut it off sometimes or leave it in my locker. I used to spend so much time scrolling through pointless things on Instagram and then just not feeling good afterwards. So my best friends and I deleted our accounts together. I’m really trying to self-manage when it comes to screen time.

In the mountains where I am right now, we only have Wi-Fi in the academic building for homework and class purposes. At home if I got stuck on writing an essay, I’d open up YouTube and two hours later I haven’t made any progress. Sometimes I’d shut off the Wi-Fi to stop getting distracted. Here that isn’t a problem. Now that we’re halfway through the semester, though, everyone gets to choose if they get their phone back or not. Personally, I don’t think we should get them back, because the group dynamic is so good right now without the distraction of phones everyone’s faces.

I wish there was more guidance from the older generation, and especially teachers, in terms of how to monitor technology use. But then again, everyone’s kind of figuring it out at the same time. Older generations haven’t lived with the group dynamic is so good right now without the distraction of phones everyone’s faces.

I genuinely do think that most people don’t want to be wasting hours by themselves watching Netflix and surfing the web.

Keiki Kanahele-Santos
20, HAWAII

Keiki Kanahele-Santos lives on the island of Oahu in a rural 45-acre village that was founded in 1994 in an effort to create a sovereign state for native Hawaiians. The village has little internet access.

Growing up here, technology was nonexistent. There is no service here. As a kid, I didn’t know you could get internet access at your home. I thought it was only at schools. I didn’t need internet access until I went to high school. And then I was like, wow—I felt like we were going to have flying cars the next year. I didn’t even know online games were a thing until I went to school. All the kids were talking about it and I just felt left out.

Since I didn’t have internet at home, I went to school early to do homework. I play sports, so the window to do homework was maybe 30 minutes to do online assignments before practice started. Practice would finish, it’d be like 7 p.m., and I would have to come home, do my paper assignments, and then wake up early the next morning to go to school on time to get a good computer.

I have Facebook now, Snapchat, Twitter. I’m not posting my life story, I’m just trying to keep up with the world. I don’t want to be left behind anymore. We are trying to get internet up here. It would liven the place up. It might sound boring, but it would be nice just to get some movie sites. A lot of the adults up here want to get back into school, but they can’t leave because they have children and grandchildren. Internet access would help them become online students, which is what I’m doing.

Communication would be better. My grandfather sends out a lot of emails and no one answers.

I’m not trying to say “We don’t have internet, and it’s boring up here.” It would be nice if we had it. But I’d still live every day up here without it. We have the most beautiful view I could ever see. We can see the ocean, islands, and boats out at sea. It’s like summer vacation every day. It makes you forget the internet is even a thing.
or some sort of action along those lines or maybe even if I witnessed a crime take place, or I needed to call an ambulance."

What’s revealing is that this student and others perceived the world to be a very dangerous place. Cell phones were seen as necessary to combat that danger. The city in which these students lived has one of the lowest crime rates in the world and almost no violent crime of any kind, yet they experienced a pervasive, undefined fear.

**Live in fragments no longer**
My students’ experience of cell phones and the social-media platforms they support may not be exhaustive, or statistically representative. But it is clear that these gadgets made them feel less alive, less connected to other people and to the world, and less productive. They also made many tasks more difficult and encouraged students to act in ways they considered unworthy of themselves. In other words, phones didn’t help them. They harmed them.

I first carried out this exercise in 2014. I repeated it last year in the bigger, more urban institution where I now teach. The occasion this time wasn’t a failed test; it was my despair over the classroom experience in its entirety. I want to be clear here—that is not personal. I have a real fondness for my students as people. But they’re abysmal students; or rather, they aren’t really students at all, at least not in my class. On any given day, 70% of them are sitting before me shopping, texting, completing assignments, watching videos, or otherwise occupying themselves. Even the “good” students do this. No one’s even trying to conceal the activity, the way students did before. This is just what they do.

What’s changed? Most of what they wrote in the assignment echoed the papers I’d received in 2014. The phones were compromising their relationships, cutting them off from real things, and distracting them from more important matters. But there were two notable differences. First, for these students, even the simplest activities—getting on the bus or train, ordering dinner, getting up in the morning, even knowing where they were—required their

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**In their world I’m the distraction, not their phones or their social-media profiles or their networking. Yet for what I’m supposed to be doing—educating and cultivating young hearts and minds—the consequences are pretty dark.**
cell phones. As the phone grew more ubiquitous in their lives, their fear of being without it seemed to grow apace. They were jittery, lost, without them.

This may help to explain the second difference: compared with the first batch, this second group displayed a fatalism about phones. Tina’s concluding remarks described it well: “Without cell phones life would be simple and real but we may not be able to cope with the world and our society. After a few days I felt alright without the phone as I got used to it. But I guess it is only fine if it is for a short period of time. One cannot hope to compete efficiently in life without a convenient source of communication that is our phones.” Compare this admission with the reaction of Peter, who a few months after the course in 2014 tossed his smartphone into a river.

I think my students are being entirely rational when they “distract” themselves in my class with their phones. They understand the world they are being prepared to enter much better than I do. In that world, I’m the distraction, not their phones or their social-media profiles or their networking. Yet for what I’m supposed to be doing—educating and cultivating young hearts and minds—the consequences are pretty dark.

Paula was about 28, a little older than most students in the class. She’d returned to college with a real desire to learn after working for almost a decade following high school. I’ll never forget the morning she gave a presentation to a class that was even more alternatively engaged than usual. After it was all over, she looked at me in despair and said, simply: “How in the world do you do this?”

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**Ethan Snyder**
17, VIRGINIA

Ethan Snyder is a high school junior who lives in rural Virginia, where only just over half the residents have access to broadband that meets the federal government’s benchmarks.

Where I live is definitely what people would call a redneck or country area. It’s a lot of fun. There’s a great sense of community.

And there’s virtually no internet access. In my house, the internet that we have is supposedly unlimited, but we’ve already run out of gigs and it was virtually impossible to get my homework done the other day. I couldn’t load my drive or open documents. When we run out, it will only work if there’s only one device connected to the internet, and we have anywhere from six to seven people living in our house. That can really complicate things because everyone’s trying to get their stuff done at once. We sort of have to schedule when we get things done. I’m usually the first one home, so I can get my homework done. I try to rush through it. I have stayed up a couple of times to around 12 or 1 a.m., because at that point you don’t have to worry about having a super high speed because everybody else is asleep.

The hardest thing for me is just opening stuff up. It’s very frustrating when I go online and it’s raining outside, or the wind is blowing the trees and blocking the signal, or it’s snowing—then the internet is ridiculously slow and it’s so hard to even go online and open up my email. On a really bad day, it can take anywhere from five to 20 minutes. I’ll leave the computer open and go make a snack, or I’ll go outside and throw a baseball and come back.

I’m an outdoors person—I’ve never been that into the internet and electronics. I didn’t have a phone until a few months ago. I have social media, but I’m not on it that often. There’s not a real need for me to sit there and text all my friends or Snapchat, because I can just go see them.

I don’t necessarily want to stay in Louisa County. There are other factors, but part of it is the internet service—it’s just so bad.

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**Katrina Quinoz**
20, CALIFORNIA

Katrina Quinoz, a college freshman and former foster youth, was part of a committee that helped write a 2018 bill mandating access to computers and the internet for youth in care in California.

I entered the foster care system for the first time in 2009, and I’ve lived in seven different foster homes. In the first home my foster mom wouldn’t give us any internet access. She feared that youth in the system were more likely to be trafficked and things like that. She was a former foster youth herself, so I understand why she had those fears. But she never gave us a Wi-Fi password or anything. I felt very disconnected. I was in a new environment, a new city. I didn’t know where anything was.

I didn’t have any way to contact family or friends. Usually, I did it through social media. It cut me off from my sisters, who I had entered the system at the same time. My godmother found out really late that we had entered the system, and she wanted to get custody and have me stay with her in Monterey County, but I wasn’t able to contact her when it happened to let her know.

My second foster mom also had the same fear; I wasn’t allowed to have a smartphone, even if I paid for it. We were given a little bit of technology access, but not much. If I had to do something with Wi-Fi, I made sure to finish it at school. She was a mothering type that just wanted to protect the kids, but at the end of the day it made my studies harder.

Right before my senior year, I moved again. That foster mom was a lot younger than the ones I had before. She knew most things relied on technology. She had computers for all the youth to use in case they needed to do schoolwork, and later she did provide me with a smartphone. She wanted me to learn independence, and encouraged me to be safe by giving me the tools to recognize a scam. She educated me about the dangers instead of cutting me off.

When I turned 18 and could access the internet whenever I wanted, it was a little weird at first. No one’s asking me who I’m texting or what I’m doing on the computer. It took some time, but I got used to it.

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Ron Sigley is a writer who teaches at Humber College and Laurentian University.
Nowhere to hide

In 2015, the New York Times reported that people around the world were taking 1 trillion photographs each year. Young people take a disproportionate number of them. Some of the teens and tweens I’ve interviewed in my research have told me they capture more than 300 images each day, from selfies to carefully posed photographs of friends to screenshots of FaceTime calls. About a billion photographs a day are uploaded to Facebook alone.

This incessant documentation did not begin with digital natives themselves. Their
parents and grandparents, the first users of photo-sharing services like Flickr, put these young people’s earliest moments online. Without Flickr users’ permission or knowledge, hundreds of thousands of images uploaded to the site were eventually sucked into other databases, including MegaFace—a massive data set used for training face recognition systems. As a result, many of these photographs are now available to audiences for which they were never intended.

Meanwhile, digital natives are also the most intensively tracked generation at school. Millions of young people now attend schools where online learning tools monitor their progress on basic math and reading skills alongside their daily social interactions. The tools capture once ephemeral steps in students’ learning and social development.

Other software, like Bark and Gaggle, is used for security purposes, monitoring everything from students’ text messages, emails, and social-media posts to their viewing habits on YouTube by scanning for trigger phrases such as “kill myself” and “shoot.” Someone who messages a friend to say “I nearly killed myself laughing in class today” could be hauled in and asked questions about suicidal thoughts.

Digital school security companies typically delete student data after 30 days, but schools and school districts are free to keep it for much longer. The data is also frequently shared with law enforcement when potential threats are identified. It is unclear what data is being collected by security or learning software, and for how long it is kept. As three US senators wrote in a recent letter to more than 50 educational technology companies and
data brokers, “Students have little control over how their data is being used … [they] are often unaware of the amount and type of data being collected about them and who may have access to it.” After all, without any clear checks and balances, one’s bad grades or an intemperate message from middle school could be sold to a job recruitment agency years later (see “Rights of Passage,” page 32).

**Unforgiven**

In such a world, tweens and teens who put a foot wrong have a lot to lose.

Consider, for example, the young woman known on Twitter as @NaomiH. In August 2018, excited by news that she had scored a coveted internship at NASA, Naomi went online and tweeted, “EVERYONE SHUT THE F— UP. I GOT ACCEPTED FOR A NASA INTERNSHIP.” When a friend retweeted the post using the NASA hashtag, a former NASA engineer discovered it and commented on Naomi’s vulgar language. NASA eventually canceled her internship.

Or take @Cellla, who in 2015 was about to start a far less glamorous position at Jet’s Pizza in Mainsfield, Texas. “Ew I start this [expletive] job tomorrow,” she tweeted. When the restaurant owner saw the tweet, he replied, “No you don’t start that job today! I just fired you! Good luck with your no money, no job life!” His implication was clear—with a single tweet, Cellla had lost not just this job, but possibly future ones.

Other teens have paid a price for less obvious offenses. In 2016, the principal of Cañon City High School in Colorado disciplined a student for tweeting, “The concert choir and all their makeup is the only clowns we got around here.” He also disciplined 12 classmates for simply liking the tweet. In 2018, a senior at Sierra High in Tollhouse, California, shared a post of Snoop Dogg holding what appeared to be a marijuana joint. She was suspended for “engaging in inappropriate sexual and drug propaganda.”

Maybe these posts are indeed bad form. But isn’t this precisely the sort of inane behavior expected of teens? And if teens can’t be a bit outrageous and make stupid mistakes, what’s at stake? Are we losing that elusive period between childhood and adulthood—a time that has, at least for the past century, been set aside for people to explore, take risks, and even fail without significant consequences?

Erik Erikson, a 20th-century psychoanalyst best known for his theorizing on identity development, suggested in his 1950 book *Childhood and Society* that the adolescent mind is in “a psychosocial stage between childhood and adulthood, and between the morality learned by the child, and the ethics to be developed by the adult.” During this period, the adolescent can enjoy a “psychosocial moratorium”—not on experience, but rather on the consequences of decisions.

Not all young people have consistently been granted this moratorium on consequences. Indeed, youth incarceration rates in the United States suggest that the opposite may hold true for some—particularly for young men from Latino and African-American backgrounds. Still, in most communities, most people agree that children and teens should be able to make mistakes from time to time and have those mistakes both forgotten and forgiven. This is precisely why most jurisdictions treat young offenders differently from adults.

But for digital natives, the constant recording of even their most minor mistakes and embarrassments means that this long-standing agreement now appears to be threatened. And this isn’t bad news only for them, but for society at large.

**Prisoners of perfection**

My research on youth and media practices indicates that as young people lose their ability to explore new ideas and identities and mess up without consequence, there are two critical dangers.

First, some are already becoming so risk-averse that they may be missing out on at least some of the experimentation that has long defined adolescence. While people like NaomiH and Cellla get into the news for their indiscretions, what’s less visible is how carefully many digital natives now curate their online identities, taking their cues more from CEOs than from their reckless peers.

LinkedIn originally had an age minimum of 18. By 2013, the professional networking site had lowered its age floor to 13 in some regions and 14 in the United States, before standardizing it at 16 in 2018. The company wouldn’t say how many middle and high schoolers are on the platform. But they aren’t hard to find.

As one 15-year-old LinkedIn user (who asked to remain anonymous for fear of losing her account) explained to me, “I got my first LinkedIn page at 13. It was easy—I just lied. I knew I needed LinkedIn because it ranks high on Google. This way, people see
Trapped in amber

my professional side first.” When I asked why she needed to manage her “professional side” at 13, she explained that there’s competition to get into high schools in her region. Since starting her LinkedIn profile in eighth grade, she has added new positions and accomplishments—for example, chief of staff for her student union and chief operating officer for a nonprofit she founded with a 16-year-old peer (who, not surprisingly, is on LinkedIn too).

My research suggests that these users aren’t outliers but part of a growing demographic of tweens and teens who are actively curating their professional identities. But should 13- or 15-year-olds feel compelled to list their after-school activities, academic honors, and test scores on professional networking sites, with photos of themselves decked out in corporate attire? And will college admissions officers and job recruiters start to dig even further back when assessing applicants—perhaps as far back as middle school? The risk is that this will produce generations of increasingly cautious individuals—people too worried about what others might find or think to ever engage in productive risks or innovative thinking.

The second potential danger is more troubling: in a world where the past haunts the present, young people may calcify their identities, perspectives, and political positions at an increasingly young age. In 2017, Harvard University rescinded admission offers to 10 students after discovering that they had shared offensive memes in a private Facebook chat. In 2019, the university withdrew another offer—to Kyle Kashuv, an outspoken conservative survivor of the Marjory Stoneman Douglas High School shooting in Parkland, Florida. In Kashuv’s case, it wasn’t a social-media post that caused the trouble, and it wasn’t an adult who exposed him. Back in 10th grade, Kashuv had repeatedly used the N-word in a shared Google document created for a class assignment. When Harvard accepted him, his peers recovered the document and shared it with the media.

There are reasons to applaud Harvard for refusing to take these students. Such decisions offer hope that future generations will be held accountable for racist, sexist, and homophobic behavior. This is a step in the right direction. But there is a flip side. When Kashuv discovered he had lost his place at Harvard, he did what any digital native would do—he shared his reaction online. On Twitter, he wrote, “Throughout its history, Harvard’s faculty has included slave owners, segregationists, bigots and antisemites. If Harvard is suggesting that growth isn’t possible and that our past defines our future, then Harvard is an inherently racist institution.”

His argument may be a poor excuse for his actions, but it raises a question we can’t afford to ignore: Should one’s past define one’s future? The risk is that young people who hold extreme views as teenagers may feel there’s no use changing their minds if a negative perception of them sticks regardless. Simply put, in the future, geeky kids remain geeky, dumb jocks remain dumb, and bigots remain bigots. Identities and political perspectives will be hardened in place, not because people are resistant to change but because they won’t be allowed to shed their past. In a world where partisan politics and extremism continue to gain ground, this may be the most dangerous consequence of coming of age in an era when one has nothing left to hide. Kate Eichhorn’s most recent book is The End of Forgetting.
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I (28M) created a deepfake girlfriend and now my parents think we’re getting married

I didn’t want a girlfriend. Don’t get me wrong, I like girls—I just don’t have time for the hassle of dating right now. But I was at a family reunion last year and my parents kept making comments about me still being single: “Oh, he works too hard” and “He’s shy; he just needs to give himself some credit.” My mom was asking my aunts if they could set me up with girls they knew. It was getting to be too much.
So when I got home from the reunion, I signed up for a Worthy account. It was pretty simple: I filled out some information about myself, put in my preferences for gender and age, and in seconds I had an AI-generated virtual girlfriend named “Ivy.” She sent me a text: “Hi, I’m looking forward to getting to know you.” I texted back right away, “Me too, how’s it going?” and my Worthy score in the corner of the screen went up from zero to five.

You start by texting your virtual significant other, but as the relationship progresses, you can send and receive voice messages, go on virtual dates, and talk over video calls. You get points based on the quantity and quality of your interactions. Once I reached a high enough Worthy score to be at Level 3 (“Spark” level) in the program, I could upload photos and short clips of myself and Worthy would insert my virtual girlfriend into them. That would give me ammunition to tell my parents I was dating someone. They live in Seattle and I’m in Boston, so we mostly stay in touch via texts and photos anyway.

It’s not like I was being completely dishonest, either, because I would be getting dating experience. Just a lot more efficiently. Worthy gets you through the awkward, shallow online dating phase using an AI that teaches you to be a more emotionally intelligent romantic partner—which is what girls want, right? You don’t have to disappoint or be disappointed by a real person. And if you get too busy, you can just put your account on hold.

You have to treat the relationship seriously to get a high Worthy score, though. If you ask your AI partner how their day is going, listen to them, and send them virtual flowers on your “anniversary,” your score goes up. If you ignore them, talk over them, or say insensitive things, it goes down. Worthy’s algorithms learn your behavior and react realistically. So you can’t hack the system by sending virtual flower bouquets nonstop. The program will flag that as being insincere and your rating will take a nosedive.

Once you have a high enough score, you can transfer your account over to Worthwhile, which is the company’s actual dating site. Over there, you can see everyone else’s Worthy scores and they can see yours before you decide whether or not to contact each other. But I wasn’t thinking that far down the line when I started. I just wanted the photos and videos from Worthy to keep my parents off my back.

You’ve probably already guessed the big problem in this plan: When it comes to physical appearance, there are only 12 models of Worthy girlfriends to choose from. The AI uses your profile to design a compatible personality, and there are about a hundred name variants, but if you did an online image search for any of their faces, each one would show up next to thousands of Worthy users. The company could easily create more
models, but they limit the number so they’re easily recognizable as Worthy girls (i.e., proprietary software). My parents aren’t very tech or social media savvy, but if they ever happened to see another photo of the same Worthy girlfriend model online, or if they were to share a picture of me and my “girlfriend” with one of their friends, my cover would be blown.

Luckily, there’s a deepfake app called FaceAbout that alters Worthy media files. It’s not approved by Worthy, but the quality is still really good and it works right in the Worthy interface with barely any lag time. It also doesn’t seem to have any of the glitching that happens in high-res video with the cheap deepfake apps. FaceAbout needed at least six facial photographs to make my Worthy girlfriend look like someone else. Scrolling through my phone, I found a bunch of recent photos of my friend Mikala (not her real name, by the way) from when we’d gone to Fan Expo together, so I uploaded those. My parents have never met Mikala, so I wasn’t worried about them questioning why two different girls in my life had the same face. All told, it took me about 15 minutes to set everything up.

**Edit: Yes, the FaceAbout app has a standard user agreement where you check a box stating you have permission to use the photos you upload. Pretty much every photo or video manipulation app has some disclaimer like that and no one reads them. Okay, I admit it’s maybe a little weird to use my friend’s face to create my fake girlfriend without telling her. But remember, I’m never showing these photos to anyone other than my parents. Mikala and I have known each other for years through online games, but we only recently discovered we live in the same city and started hanging out in person. She’s cool and no-bullshit and has a girlfriend of her own. I don’t want her to think there’s anything weird between us just because I’m using some photos of her, because there really isn’t.

My first few conversations with Ivy were pretty generic: “Hi, how’re you?” “Good, what you doing?” “Just got back from the gym.” That sort of thing. A few days later, I said I was going to see the new *Alien* movie next weekend, and Ivy sent me a photo of herself in a Xenomorph T-shirt standing outside a theater, sticking her tongue out at the camera. She texted, “Opening night, baby!” It was Mikala’s face, of course, on a taller, slimmer body, and that weirded me out for a couple seconds. I knew it was a fake image, but it was still cute. We agreed to do an *Alien* series marathon. (“Watch a movie together” is one of the virtual dates you can choose from, along with “Cook a meal,” “Watch a sports game,” “Go for a walk,” and others.) While we were watching, she was texting me things like “RIPLEY GTFO FORGET THE CAT ALREADYYYYY” and it was cracking me up even though I knew she wasn’t really watching a movie with me.
I sent Ivy a cookie basket. The cookies are virtual, but it still costs $11.99. Which is like a third of the price of a real cookie basket. That part of the Worthy experience is honestly a ripoff. I mean, it literally costs them nothing. But the next morning, I woke up to see photos of Ivy with this big basket of cookies. They looked really good, and Ivy looked really happy. She sent me a text filled with heart emojis.

**Edit: Since so many of you are asking the exact same question in the comments: No, the Worthy platform doesn’t have porn. You can have smutty conversations with your Worthy partner, but that’s it. They even delete nude pics.**

**Edit: All of you asswipes making fun of Worthy users, saying what’s the point of a fake girlfriend without porn, are derailing the thread and need to grow up. BTW, all of Worthy’s girlfriend models are deepfaked on porn sites; they’re easy to find.**

After two months, Ivy and I were texting every day. We’d been on six dates. It wasn’t all smooth sailing. My Worthy score went down after I belittled her taste in ‘90s music, and then went down even further when my apology “wasn’t really an apology.” (It took me days of troubleshooting with the different suggested reconciliation routines to get back into her good graces.) But I finally saw my Worthy score go up to “Spark” level. I immediately used the app to take a selfie of myself in Harvard Square. When I checked my camera roll, there was a photo of me and Ivy together, standing in front of the old magazine kiosk and smiling into the camera. She was dressed for the weather in a cute red sweater and her cheeks were a little rosy from the cold. She looked great. She texted me, “I had a great time hanging out with you today. Let’s do it again soon. <3”

I told my mom I was seeing someone and sent her the photo of me and Ivy together. My mom was ecstatic. She told me she was “so glad I took her advice to get out and meet new people,” and that “life is too short to spend alone, you know!” My parents began asking about Ivy every time I talked to them. My mom wanted to know all the details—how we met, how old Ivy was, where she was from, what her job was, on and on.

That’s when I started to feel uncomfortable about the whole thing. I thought that once I told my parents I was dating someone, they would leave me alone, but it turned out they were only more interested. Worthy gives each of its 12 standard models a backstory, but it’s not really enough to be convincing. I had to fill in the gaps with some of Mikala’s life and some stuff I made up. I might’ve made Ivy sound too good. According to me, she was 27 years old, a successful lawyer, and into cooking and photography.
I was also spending more time talking to Ivy than I originally meant to, and a lot more than I needed just to get photos and videos to send to my parents. She was upbeat and nonjudgmental—I found myself telling her stuff I couldn’t even tell Mikala sometimes, and as long as I treated her well she didn’t send mixed messages or try to guilt me like some other girls I’ve been with. After six months, we’d gotten to “Committed” level and I was constantly getting emails and notifications from Worthy encouraging me to upgrade to Worthwhile. I guess their algorithm thought I was ready to move on to dating real humans.

I looked into it, but I’d heard about people making the move to Worthwhile and being disappointed. Meeting people IRL is more complicated and unpredictable, and I read a review that said having a high score on Worthy doesn’t actually seem to get you more or better dates when you move to Worthwhile. Also, Worthy is rated 4.1 stars on AppChart and Worthwhile is only 3.4 stars. So a lot of people stick with Worthy. I even read about this one lady who tried to get married to her Worthy boyfriend. (She couldn’t.)

I decided to tell my parents the truth. When I went to visit them over Thanksgiving, I would explain that I’d lied about having a girlfriend for the past year because I was frustrated with their well-meaning but selfish expectations of me. Worthy has a “Talking Tips” feature that helps you frame your feelings when you have difficult conversations with your AI partner. I was going to straight-up use their template on my parents.

The problem was, I couldn’t do it. When I showed up, my mom and dad were so happy to see me that I couldn’t burst their bubble. I’m an only child. My mom comes from a big family and always wanted more kids, but my parents needed the carbon footprint household tax break in order to pay off their student debt. My dad is an only child, too, and my grandparents are always asking him if I’m married yet. With the falling birth rates and stuff, I guess they’re all hoping for grandchildren so our family doesn’t just … end, I guess.

Then things went downhill. My mom gave me grief about not bringing Ivy home to meet them. My dad insisted we all video chat with her before Thanksgiving dinner.

I was sweating bullets. I couldn’t think of a good excuse to say no. My membership plan on Worthy includes 10 minutes of video chat per week, but I’d already used them up. I contacted Worthy technical support and bought 15 add-on minutes at an exorbitant price. When I called Ivy with my parents in the room, I was sure the jig was up. There’s a big Worthy logo right in the corner of the screen, but my parents just thought it was the logo of the video chat app. Then Mikala/Ivy appeared on screen and said, “Hi, sweetheart!” just like normal. I introduced my parents and we all had this totally nice, normal conversation. Sometimes Ivy paused
before answering—I'm not sure if it was the AI querying a database of all the right things to say to a boyfriend's parents, or if it was the FaceAbout app applying the deepfake, but it was barely noticeable. It just seemed like she was thinking more than usual, maybe nervous talking to my parents. A perfectly normal way for a human to act under the circumstances.

My parents were charmed. When we were about to hang up, I said “See you later,” and she said, “I’m so glad you finally introduced me to your parents. I can’t wait to spend more time with them.” That’s probably a stock line of dialogue, but my mom took it as a sign that Ivy was serious about marriage, and that I was the one dragging my feet. She was on my case about commitment the whole rest of the weekend, and then flat out asked me when I was going to propose. That’s when I should’ve told them the truth. I think if we had been texting or emailing, I could’ve done it. But it’s different when you’re talking to someone in person. I don’t know what came over me, but I just blurted, “Next year.”

Now that it’s January, my mom has started sending me articles about the best places to shop for engagement rings and how to judge the quality of diamonds. Lately, Ivy has been breaking out of girlfriend mode, saying, “We haven’t been talking as much. It seems to me that you’re ready to move on to a more fulfilling relationship. Why not take the next step in your love life and contact Worthy customer support about upgrading to a Worthwhile membership?”

(FWIW, I think the company is really pushing the upgrades because they’re losing customers to competitors. There are a ton of other dating apps to choose from, and some of them are even offering discounts for people with good Worthy scores.)

I feel awful for lying to my parents, but I don’t want to give up Ivy. I like being able to chat with her about anything, knowing she’s always there for me, doing nice things for her and making her happy. I didn’t know how much I’d enjoy feeling connected to another person like that. I’m online talking to other people all day, but it’s just not the same as knowing that you matter to someone else. Except none of this is real. I’m such a mess.

TL;DR: I used dating and deepfake apps to fool my parents into thinking I’m in a serious romantic relationship. Also, I think I have real feelings for my virtual girlfriend.

UPDATE: I’m literally shaking right now. I can’t believe how badly I screwed up. I took the advice some of you gave me and decided to spend more time with my friends in real life to get my head back on straight. I’ve been hanging out with Mikala more often. She and Ivy have the same face, so it’s kind of like hanging out with Ivy, except that
Mikala is a real person. They have different personalities, though, and like I said, we enjoy hanging out as friends and there’s no chance of anything happening between us. (And NO, I don’t have unfulfilled sexual desires for her like some of you keep insisting.) Though sometimes my brain does this little skip where I can’t recall if a memory I have was with Mikala or with Ivy.

Anyway, today, Mikala and I were having lunch and I got up to go to the bathroom. I left my phone on the table and while I was gone, Ivy texted me a selfie with the message, “Miss you lots! XOXO.” Mikala happened to look down at the notification and saw her own face blowing a kiss at the screen. When I came back to the table, Mikala was holding my phone and scrolling through my camera roll which included dozens of photos of Ivy, and some of me and Ivy together. She demanded to know where the hell the photos had come from.

All the blood was rushing to my face and I felt like throwing up. I told her the whole story. I didn’t know what else to say. The expression on her face made me want to shrivel up and die. She said, “I can’t imagine why you could’ve thought this was okay on any level.” She got up and left. I don’t think I’ll ever see her again.

**Edit: I haven’t used Mikala’s real name in this post, so don’t bother trying to search for her. I don’t want anyone showing this to her or trying to contact her.

**Edit: Frankly disturbed by how many of you are discussing how to use the FaceAbout app on your own friends and significant others. Are you learning nothing here??

UPDATE: Thanks everyone for your advice and support. I don’t know how I could’ve gotten through this past week without the help of strangers on the internet. I especially appreciated hearing from other people who’ve had their own bad experiences with Worthy. It made me feel much less alone. (@Josching21, I agree that what your girlfriend was doing with “Evan” counts as cheating and you should dump her.) Some of you are jerks who deserved to have your comments deleted, but I appreciate that others took the time to share stories about being deepfaked and were nice about helping me to understand why Mikala was hurt by what I did. (@AngJelly, I would never have gone that far. I hope you sue that asshole.)

A few days ago, I received a video message from Ivy. The look of disappointment and betrayal on her face was just like the one I’d seen
on Mikala. They do have the same face, after all. She said, “I’m deeply hurt by your behavior. A healthy relationship is based on mutual honesty. It seems you were just using me, and not actually invested in improving yourself as a person. I’m sorry, but I can’t see you anymore.”

It turns out Mikala contacted Worthy customer service and told them that I’d used her likeness without permission. (I don’t know if she tried to contact FaceAbout as well, but they’re based in Belarus and don’t seem to have a contact number or email. Last time I checked, I could still use the app.) I got an email from Worthy informing me that due to my violation of their terms of service, they’ve suspended my account and deleted all my saved history with Ivy. However, they added that their company is based on the philosophy of helping people learn from interpersonal mistakes, so I can reactivate my account after three months, although my Worthy score would be reset to zero.

I told my parents that Ivy broke up with me. It’s the truth. I didn’t even have to pretend to sound gut-punched. My mom is convinced that I “let a good one go” because of my lack of emotional maturity, but she also says that “there are plenty of fish in the ocean” and I just need to “put myself out there again.” I’m not ready, though. I still check my locked-down Worthy app several times a day out of habit, hoping to see a message from Ivy, even though I know there won’t be any more.

The good news is that this whole experience has taught me I need to evaluate how I relate to people. I’ve been deluding myself into thinking that actions in a game-learning environment are a substitute for true human connection and authentic personal growth. That’s how my therapist, Susan, puts it, anyway, and I agree. I’ve started seeing her twice a week. The appointments happen online, which works well for my schedule. Actually, she’s a virtual program. After Ivy broke up with me, I got a 40% discount code from Worthy for their mental health app, Worth It, which guides you through a 60-day “Healing From Loss of a Relationship” program. I’m also planning to do the 30-day “Recenter Your Self Worth” module. Not sure if I’m going to upgrade my subscription to do the 90 days of “Opening Yourself to Possibilities,” but I’ve read good reviews about it.

TL;DR: Thanks to all of you, and to Susan, I’m moving on from this difficult experience with all the support I need to become a better person. Peace!
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Video games: scourge or savior?

From “Will Pac-Man Consume Our Nation’s Youth?”: Some opponents of the video-game craze see the best minds of the next generation being destroyed by the computer. They point to evidence that devotees will resort to anything to feed their habit. This February, police in Tokyo nabbed a five-boy video gang that had stolen an estimated $39,000 in cash and jewelry to bankroll their habit. In South Florida, some residents have complained that the opening of video arcades seems to correlate with an upsurge of petty theft. Others, however, point out that at least young people are doing something basically harmless with their money. “It’s a good substitute for bad vices,” Don Fudge, head programmer at Avant-Garde Creations, asserted at a recent Applefest in San Francisco. Fudge speculated that the quarters teens pump into arcade games might otherwise be spent on drugs.

From “Video Games That Teach?”: Experts on learning emphasize that the secret to education is to motivate the student—to give him or her a compelling reason to want to absorb the information. In a good game, players lust after high scores and, more fundamentally, staying “alive.” Adventure games also motivate the player by inducing the urge to explore: “If you succeed, you get to go somewhere new,” explains Michael Knox, president of Park Place Productions, which makes video-game and computer software … So far, the marriage of education and video-game-like entertainment has produced some not-very-educational games and some not-very-entertaining learning activities … These technologies will result in a more satisfying crop of products only if the two cultures that dominate our children’s lives—education and entertainment—do a better job of figuring out what the other has to offer.

From “From Playstation to PC”: The school bell rings, and teenagers flood the hallways. Many pull out Cybikos—popular handheld devices that are a combination personal digital assistant, wireless messenger and game machine. This is the new face of video gaming—mobile, networked, interactive. More to the point for society at large, its rapid adoption by a generation of young computer users may herald aspects of the future of computing in general—from PCs, to personal digital assistants like the Palm, to cell phones. You may soon be able to take a virtual walk through your computer’s contents, interact with scores of people in real time and send artificially intelligent agents out to do your bidding; and if you do, you will owe a word of thanks to game devices like Cybikos. “The segment of software that has pushed hardware development most is games,” says game developer Bernard Yee.
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