n 1992, I was in a meeting at Apple Computer and was asked if I wanted to see the next “killer technology” the company would soon release. My Apple colleague left the conference room and came back to unveil the Apple Newton, a handheld device (sort of) that Apple was calling a “Personal Digital Assistant” (PDA) and that featured handwriting recognition. I flipped back the gray metal lid and tried the stylus, writing to my wife, “Dear Pat.” My writing, converted to text on the fly, came back as “Deal Pot.” The Apple team reassured me that the software was getting better, but problems in the Newton’s handwriting recognition continued to plague the device, as did its high price, and Steve Jobs killed the product in 1998. The Newton was widely considered a failure. 

Reading Signals from the Future: 
EDUCAUSE in 2038

By Paul LeBlanc
The Institute for the Future in Palo Alto, California, uses the phrase “signal from the future” to describe a technology like the Newton. The notion is that we are surrounded by signals from the future—artifacts in current use that presage a future trend or development, even if they are commercial flops in the present and are eventually abandoned, as was the Newton twenty years ago. Yet although the Newton was deemed a failure at the time, it foreshadowed the PalmPilot, which dropped the handwriting recognition for other functions such as scheduling and contact management and became the first widely successful PDA. The Blackberry came later, adding phone capabilities, and we all know what happened next. In 2007, Apple released the first iPhone. Twenty years after the Newton, the newest iPads (an offspring of the iPhone breakthrough technology) have excellent handwriting recognition.

Online learning is a mainstay of higher education. Data analytics, common in so many industries, is starting to take hold in higher education. Supplied with that data, machine learning is being applied to a variety of areas such as persistence, assessment, personalized learning, and improved workforce pipelines. But these are not signals from the future—they are technologies that are already reshaping our work.

What are our present-day signals from the future? Although we may flounder and perhaps fail in our current attempts to use them (à la the Newton), I suggest paying attention to four: game play and immersive learning; virtual and augmented reality; connected learners; and artificial intelligence.

Game Play and Immersive Learning
The idea of game play is hardly novel. Kevin Bell, for example, has discussed “gamification” and how we might harness the engagement strategies of game design in designing learning experiences. But in addition, I’m thinking about the power of games as immersive learning environments, which do the following:

- Put the user into a world that requires exploration and increasing mastery
- Make this world so engaging that the user can engage for hours, in the “flow,” not noticing the passage of time
- Utilize their built-in intelligence to alter the environment to calibrate to the user’s level of mastery and to present the next challenges at just the right pitch
- Place users into that environment with others, and in many cases, require them to work collaboratively to be successful
- Yield “wow” moments of satisfaction and accomplishment

This may be a good description of the ideal learning experience. In 1993, when I was leading a technology team at Houghton Mifflin Company, I kept showing anyone who would watch a new, captivating computer game called Myst, which I played for hours at a time (don’t tell Houghton). I remember thinking that it would be the future of learning. As it turns out, of course, this early game was a Model T compared with today’s computer games and their startling realism, artistry, and technology. Costing tens of millions of dollars to create, they are a signal of what is to come in learning.

Virtual and Augmented Reality
Virtual reality (VR), an extension of the immersive learning/gaming environment, is already being used in entertainment: movies, games, and pornography. VR is also being deployed in industrial settings. For example, ThyssenKrupp is using VR to enable elevator technicians to “go into” a repair before entering the physical site; wearing a “HoloLens” (a VR headset), they are able to understand the problem, the fix required, and the parts and tools needed before ever climbing into an elevator shaft. We can expect VR to transport students into immersive learning environments.
worlds so that they are able not only to understand ancient Rome, for example, but also to feel what it was like to be there. VR has the power to create empathy in ways largely unavailable to most students, as they “live” the experience of a modern-day refugee, of a Mississippi slave in 1835, or of a disabled person navigating the workplace today.

Augmented reality (AR) is sometimes posited as an incremental step toward VR, but I think it is actually more powerful. Rather than providing an alternative reality, as VR does, AR offers a hybrid reality. Most of us are online or off-line. Members of Generation Z, by contrast, are never off-line or online; they reside simultaneously in both. They live in a hybrid world. We had a dorm fire at SNHU last year, and although everyone escaped unharmed, many residents lost all of their possessions. When our team gathered and made a list of the things we could quickly replace (computers and clothing and phones and so on), what was the only thing students had with them as they left their smoky rooms? Their phones. They live in a blended world already.

AR is powerful because it takes the ultimate immersive learning environment—physical life—and overlays it with information. It melds physical information, what we ascertain with our senses, with digital information. Immersive and visual experiences are powerful, but they lack the distance—and thus the insight—that writing allows. For example, breaking-news footage of a bombing can be vivid and make us feel the immediacy of what is going on, but it is only later, when we read about the details, that we gain an understanding. As Jay David Bolter described in 1984, we have in the modern world moved from a world of written literacy to visual literacy, in which the textual is subservient to the visual. AR has the ability to bring both together. While the devices we use to combine the two remain clumsy, such as holding up my phone to harness its camera to yield an AR trigger—for example, pointing it at the Eiffel Tower and getting historical and other information about the landmark—a much-maligned and failed product probably signals how we will someday access AR: Google Glass. That heralded 2013 product had a short life (pulled from the market in 2015), but its next iteration is in use in industrial settings and has been used to help autistic children learn. With the iPhone, Apple got the last laugh regarding the Newton. Keep an eye on smart glasses and AR.

Connected Learners
When you read “connected learners,” do you think about networks, Wi-Fi, and online learning? Instead, I am talking about learners who are connecting by producing and sending data. In a world with sensors everywhere, look for humans to be laden with sensors that provide feedback first to them and then to others. Do you wear a Fitbit? It’s a sensor. We are increasingly accustomed to the Internet of Things, like those ThyssenKrupp VR headsets that enable elevator repairs and the Samsung refrigerators that can order more milk when needed, but the Internet of Humans is the hot innovation space right now. This is happening first in areas of fitness and health, with amazing potential for good. It is not an enormous leap to think about connected learners, especially as we discover more about the intersection of learning with physical and cognitive dynamics.

Connected learners are likely to send data on simpler things: Are they getting enough sleep? Are they anxious? Are they getting enough exercise? But what if you could take a drug that allowed you to learn Chinese 50 percent faster? Assuming no side effects, would you take the drug? Research is yielding startling results in this area. Imagine, then, that a body sensor indicates a learner needs a dose of valproate to prepare for finals. We think of the use of performance-enhancing drugs in sports as cheating. What about in learning? In all events, the Fitbit may be a signal from the future.

Artificial Intelligence
Artificial intelligence (AI) is here now (as is machine learning, noted above), so technically it is not a signal from the future. However, it is not yet a strong force in higher education and thus bears mention. AI will radically alter the way we do our work. This will probably happen first in administrative functions, such as guiding students through processes for financial aid, course registration, and career pathways. It will increasingly be deployed as an aide, from help desk to tutoring. It will make possible individualized learning pathways and adaptive learning and will erase the difference
between formative and summative evaluation. AI will be the engine behind immersive learning and will be inextricably linked to the use of data. It is likely to be preferred over human interactions in many instances, since those in Generation Z will grow up completely comfortable with human-machine collaboration. Siri and Alexa will join a circle of friends and professionals, there whenever needed.

**Conclusion**

In 2038, EDUCAUSE will be making sense of a world dramatically different from the one in which we live today. Like dog years, technology years go by faster than human years. In other words, the velocity of change is increasing. The tablet computer reached 50 percent adoption in just five years, whereas the telephone took 100 years to reach saturation. New technologies influence our world in exponential ways that outpace our ability to understand and manage them well. Take a look at the impact of hackers who recently weaponized social media in elections around the globe and our ongoing inability to respond with the right mixture of technology, security, public policy, and practice.

As we look at this challenge through a higher education lens, EDUCAUSE will need to not only explain the emerging technologies but also broaden its view to take up issues of policy, regulation, and management (which it does now) as well as ethics, morality,
and philosophy. The technologies of the next twenty years offer enormous opportunity for great good—but also for great harm. EDUCAUSE has an important role to play as a translator and as a bridge between disparate fields. We will need as many ethicists and sociologists at EDUCAUSE gatherings as IT staff and edtech vendors.

Every field and every industry is grappling with a version of this problem, trying to stay ahead of the technology to yield its greatest good while offering protection from its potential for harm. In that sense, the signal that must receive most of our attention is not one from the future after all. Rather, it is a signal from the past: that is, every life has value and dignity and a right to self-determination. What that means in an increasingly technological world may be the most important question of the next twenty years. EDUCAUSE can help us find the answer.

Notes
4. Burning Glass Technologies is the best-known product here, though it is certainly not alone in this market.
6. Despite its obvious and tawdry problems, the porn industry pushes technology like few other industries.

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