My relationship with technology has been a lifelong love affair, one that probably started when I took apart appliances in the basement or when my brother and I invented our own radio shows on a cassette recorder in the early 1970s. Being a digital immigrant is usually understood to be a deficit, a lack of fluency borne of growing up in the dark time before computers became ubiquitous. And yet, never knowing a time without computers or the Internet also means missing out on the powerful wave of excitement and optimism as we experienced the dawning of the computer age. The sense of wonder we felt as we looked to the future was powerful and palpable. Instead of taking for granted a world that was “always on,” we painstakingly learned DOS commands, deciphered the mysteries of motherboard DIP switches, and lived these early years with our operating system on one 5¼-inch floppy disk drive and the entire archive of our digital lives on the other.

Back to the Future of Edtech: A Meditation

John O’Brien
Even though science fiction writers had provided several decades’ worth of cautionary tales of robot overlords and dystopian possibilities, it was their optimism that most captured our imagination. Among other things, we imagined that technology would solve world hunger, and thanks to the Jetsons, we were pretty sure that wristwatch video phones, jetpacks, and robot servants were in our future. While we played Pong on our state-of-the-art Atari consoles, we marveled at trips to the moon, Skylab, and the exciting new space shuttle program.

Growing up as an immigrant to this world of technology-enabled possibility filled me with a sense of endless wonder that may come less easily to natives. The tectonic technology changes of the 1960s and 1970s have left me always looking forward, glancing back—excited about the march toward the future but deeply aware of the historical journey that has brought us this far.

This crossroads where the past and future meet can be jarringly beautiful, as the digitally colorized photos of Sanna Dullaway vividly dramatize. Using the lens of the past to understand the future gives us the hope that we need not repeat our mistakes. It illuminates the past and opens our eyes to a deeper understanding of the present. Lewis Hine’s photos of child labor from a century ago are powerful in their own right, but Dullaway amplifies their power for the 21st century. When we look at Hine’s century-old images, our impression is colored by current belief in our own advancement. But somehow a splash of literal color reminds us that the 21st century may not be that advanced and that we have our own collection of shameful images of child labor happening right now. Understanding the past is important, and thinking about the future is fundamentally human, but more fascinating still is the combination, the history of the future: the road pointing back to where you were, the road pointing ahead to where you’re going, and the moment at the crossroads contemplating both.

### Remarkable Paleofuture Artifacts

There is an emerging field of academic inquiry related to this line of thinking. Self-proclaimed “time capsule nerd” Matt Novak calls it paleofuture, while “ed-tech’s Cassandra” Audrey Watters calls it the *history of the future*. Instead of focusing exclusively on representations of the past (the work of historians) or on those of the future (the work of futurists), paleofuturists concentrate on representations of the future in the past. Since the 19th century, technology permeates so many images of the future that in many ways, paleofuture often amounts to representations of a tech-rich future in a relatively tech-poor past.

Paleofuture artifacts are amazing in many respects. For nostalgic reasons, I’m fond of predictions from the 1950s and 1960s about life in the 21st century, such as Philco-Ford Corporation’s remarkable 1967 film *Home of the Future: Year 1999 A.D.* (world fairs repeatedly turned to Home of the Future exhibits). Other films from this time reveal as much about the decades they were conceived in as the one they imagine. *The Monsanto House of the Future*, for example, loudly sings the praises of “man-made fibers.”
and plastics, at one point rhetorically asking “Is everything of plastic?” and breathlessly answering: “Almost!… a dream of the future brought to reality by Monsanto.”

However, much older paleofuture artifacts are uniquely captivating. One of the best-known history-of-the-future collections is a series of fin de siècle cards created for cigar boxes by the illustrator Jean-Marc Côté to depict advances imagined to be ubiquitous “in the year 2000” (En L’An 2000). In 1986, Isaac Asimov discovered and published them with his commentary in the book Futuredays: A Nineteenth-Century Vision of the Year 2000. The images typically feature a technology-rich future, with technology “improving” everything, from barbering to farming (see figure 1 and figure 2).

**Educational Technology Artifacts**

It’s clear that the century that conceived of the Industrial Revolution imagined a future world in which technology would ease the burden of work. But what about the “burden” of education? My fascination with the paleofuture of educational technology began when I first saw the well-known 1899 Jean-Marc Côté illustration At School (see figure 3).

If you focus on the students in their desks and set aside the boy with the hand crank, the image from over a hundred years ago is in many ways an uncannily accurate depiction of students today (see figure 4).

The hand crank, however, is a wonderful example of what I think of as a reverse anachronism. When representations of the past include things that came only later, we waive the anachronism flag, such as when Shakespeare has Cassius declare “the clock has stricken three” centuries before mechanical clocks were even invented. A reverse anachronism involves futuristic representations that fail to fully escape their own non-futuristic thinking, like the En L’An 2000 card showing a futuristic train composed of what appears to be old-fashioned bricks and mortar. There are additional ways in which the At School illustration demonstrates this concept. For example, the students still use traditional desks (for what?) that are lined up in rows (why?), and the students, still wearing the clothes of the 19th century, remain no more visibly diverse than in the artist’s time.

Let’s return to the fascinating (for me, at least) hand crank, which is about to chew up a copy of a book on the history of France. A century ago, it would have been nearly impossible to imagine a process of digitization, and so gears would be the closest metaphor available for engineering magic following the explosive growth in the use of gears during the Industrial Revolution. According to this interpretation, the crank reveals the artist’s rudimentary understanding of the process that would convert paper books into audible format. In the illustration, the wires end near the students’ ears with some kind of listening device (headphones or “electrophones” were known as early as 1895).

On the other hand, it may be that the artist imagined something well beyond the idea of converting paper to audio. Maybe this is an example not of a reverse anachronism but of something far more futuristic. Perhaps the artist imagined that the wires carried digitized ideas, not sound. With this interpretation, the...
cranking mechanism goes from a precious understanding of digitization to a prescient picture of technology that—still not available in 2017—was predicted by Athelstan F. Spilhaus, dean of the University of Minnesota’s Institute of Technology, in the December 1965 strip Our New Age (see figure 5).

This technology may yet be coming. Memories have been mechanically planted in mice, and in recent developments in neuroprosthetics (brain implants), researchers at UC Berkeley are working to create thousands of wireless brain interfaces called “neural dust.” EMOTIV’s “brain wearable” products allow wearers to complete rudimentary tasks by thinking them. Although 2016 may have been an ambitious prediction by Spilhaus, “One Laptop Per Child” founder Nicholas Negroponte predicted a couple of years ago that in thirty years, knowledge will be chemically created so that someone could take a pill to learn English or to comprehend the entire works of Shakespeare. So the hand crank may not be as laughable as it seems, and we may be far closer to learning Matrix-style than we think.

Why Study the History of the Future?

Ask a historian “why study history?” and you will get any number of answers, including the perennial axiom: “to avoid repeating past mistakes.” Peter N. Stearns has summarized the importance of studying history by noting that history helps us understand people and societies, contributes to moral understanding, provides identity, lays the foundation for good citizenship, and provides crucial skills and habits of mind to students. It is a compelling case for a compelling field of academic study.

Understanding the past also helps us recalibrate our thinking about the future, and studying failed and nailed predictions gives us a framework to better understand both. While Stearns says that “the past causes the present, and so the future,” Peter Bishop phrases the interconnectedness as an equation that contains the constituent parts of paleofuture studies: what was + what is + what if.

In the narrower universe of educational technology, Audrey Watters likewise insists: “We always tell stories of our past in order to situate ourselves in the present and guide ourselves into the future. But that means these stories about education and education technology—past, present, future—really matter.” Writing about the annual Horizon reports, she argues for the importance of studying the history of the future: “I’m less interested in the accuracy of the predictions about the future of education technology that the Horizon Report has made over the last decade than I am in what those predictions now might tell us about the history of ed-tech. I’m interested in the history of our imagination about education’s future and the role technology—and influential ed-tech storytelling—is assigned in shaping that.”

I would add, first of all, that understanding the history of our hopes and dreams gives us a deeper and more comprehensive understanding of our current time, as we see “now” as part of a trajectory that began long before (and continues into the future). I’m convinced that we have as much to learn from the visions that have been realized as from those that have not come to pass. And perhaps there is even more to learn from the misses. Why don’t we have robot teachers? Why aren’t so many more students these days math and science geniuses like Elroy Jetson? What do these disconnections mean? What can we learn from them? Past predictions that did not come true can be as instructive as predictions that unfolded exactly as anticipated.

If there is one takeaway I would hope we can learn from the study of the history of the future, it is a sense of humility and caution. We are too quick to forget our own insignificance relative to the vast scope of human history. We are not the first generation to feel we are striding forward with unprecedented technology advances. A sense of perspective on that score would be a good thing. Lacking this

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One imagined glimpse of the future captures the 19th century’s hopes and dreams about technology, critiques that very optimism, and accurately predicts technology-enabled social problems. What seems to be sheer tech-utopianism simultaneously contains a seed of doubt and caution.

A Skeptical Turn: “The Future Isn’t What It Used to Be”

When it comes to the history of the future of educational technology, various scholars have made a compelling case for skepticism about what they consider technological utopianism. According to Kentaro Toyama, for example, technology has more of a tendency to intensify humanity’s fault lines than to correct them. In his book *Geek Heresy*, Toyama uses the Daedalus story as a high-tech parable to make this point. Daedalus invents advanced technology to enable humans to fly, but when he shares it with his son, he warns the youngster not to fly too close to the sun. Children being children, Icarus ignores his father’s warning and “soars exuberantly.” As a result of his life-or-death user error, he plummets to his death. The moral of the story, aside from hubris and listen-to-your-parents, is that “brilliant technology is not enough to save us from ourselves.” Later in the book, Toyama observes about educational technology: “If you provide an all-purpose technology that can be used for learning and entertainment, children choose entertainment. Technology by itself...
Sometimes the skepticism can be seen only from the 20/20 hindsight of the future. Who, for example, could argue that there is anything dark about the rosy vision of the future seen in figure 7, from the Jean-Marc Côté collection? We have leisurely salon conversation among friends basking in the radiance of what looks to be a lovely fireplace—except when we note, with 21st-century horror, that those gathered are illuminated by the glow of a single piece of deadly radium.

Other times the skepticism seems to be an intentional part of the artifact itself. A Japanese paleofuture artifact from 1969 (see figure 8) shows a classroom of the future, again with paperless desks lined up in a row. However, a closer look reveals that this classroom is less tech-utopia and more Lord of the Flies, with students who get the answer correct smiling or barely suppressing their glee as less-correct students are bludgeoned by vigilant “robot proctor.”

While the darker side of this image of the future is hard to miss, there are more subtle seeds of doubt even in some of the most breathless utopian visions of the
future. A 1958 drawing by Arthur Radebaugh (see figure 9) imagines a teacher-less classroom of the future (again with desks in a row) in which automated teaching would be accomplished by “special machines" that were “geared' for each individual student so he can advance as rapidly as his abilities warranted." The student's work would be “kept by machine" but “would be periodically reviewed by skilled teachers, and personal help would be available when necessary." With cosmetic updates in the language and image, this 1958 artifact summarizes key ideas frequently articulated in the discussion of personalized learning today. Yet those looking for a skeptical turn might point to the distracted student, waving to his unicopter-flying friend outside the window.

This image is similar to the distracted student in another Radebaugh prediction; in this case, a student learning from home does not find his technology or his “TV instructor" as engaging as baseball with his friends (see figure 10).

Radebaugh is not the only source of paleofuture mixed messages regarding educational technology. For example, the 1967 film Home of the Future: Year 1999 A.D. (mentioned earlier) enthusiastically explains how technology improves the lives of each member of the Shore family, including third-grader James Shore. We see him learning from home with the help of 1960s-imagined adaptive learning technology, “teaching machines which allow him to progress as rapidly as his awakening mind can absorb the audio-visual lesson." When his awakening mind falls short of the expected competency, his robot proctor, lacking pedagogical patience, lets him know (“you flunk") and points him to another video lecture. James dutifully listens to the push-button lecture on Galileo for a while, gets bored, and then looks around mischievously before switching to a cartoon he enjoys, it turns out, far more.22

Another favorite of mine is a 1982 drawing conceived for Atari by Robert Stein as part of his work on the idea of an “Intelligent Encyclopedia." In this super-engaged third-grade classroom of the future, one group of students is simulating a Mars landing, and the other group is designing a spacecraft. A single student in the foreground is doing neither, focused instead on drawing a less-than-flattering picture of his teacher (see figure 11).

Returning to Côté’s 1899 illustration At School, Wat ters sees it as the ultimate expression of “our worst suspicions” about the future of education: “mechanized
and automated." She urges caution, and instead of focusing on the significance of the magic digitization crank, she looks to the role of the teacher in this brave new classroom. Far from a "sage on stage," this teacher is reduced to the equivalent of factory work, feeding the digital book-chipper. Watters argues that this paleo-future artifact confirms her worst fears about the future of education, "that it's destined to become mechanized, automated and that it's designed based on a belief that knowledge—educational content—is something to be delivered. Students' heads are something to be filled."

In fact, Watters's observation of the entire Côté set of illustrations is that they consistently depict technology automating manual labor (e.g., farmers, barbers), so when she considers the image of the classroom of the future, she wonders whether the profession of teaching (and the vocation of learning) is being represented as just another form of menial labor. The question is decidedly timely today as we contemplate personalized learning and as we imagine the role of faculty in such a future. Is this turn-of-the-century illustration the ultimate "unbundling"? Is the faculty role to be nothing more than feeding the digital book-chipper?

Watters links this illustration with the historical obsession with automation, which is linked in turn with the idea of efficiency that can be traced back to 1913 and Thomas Edison, who believed that books would "soon" be obsolete, replaced by the technology that was topping the “peak of inflated expectations” at that time: motion pictures. A decade later Edison would proclaim that schoolbooks of the age achieved “about two percent efficiency” while motion pictures should make “one hundred percent efficiency” possible. Watters response is immediate: “100% efficiency. Efficiency. What does that even mean? Because unexamined, this prediction, this goal for education, has become an undercurrent of so many predictions about the future of teaching and learning as enhanced by technology. Efficiency?”

These dual concerns about efficiency and automation (the teacher-less classroom) come together in many illustrations, including a comic strip from 1965, where the classroom of the future not only features a robot-teacher but comes with a prediction that students of the future will adapt to understand robot language, which is twice as fast (see figure 12). Efficiency.

Since 1913, there have been many more examples of high expectations about the efficiency or effectiveness of technology applied to learning. My favorite is one
It’s true that the border between audacity and hype may be in the eyes of a beholder, but as frustrating as unquestioned hype can be, it’s impossible to ignore the tremendous promise of education technology tools.

from 1958, which suggests a 38 percent increase in measurable outcomes from one piece of technology (see figure 13). Robot tutors in the sky? No, a Royal Portable typewriter.

I’ve been suggesting that a healthy dose of skepticism about our technology future is warranted, and I’ve pointed to seeds of skepticism that are embedded in even the sunniest paleofuture artifacts. Nonetheless, I’m not particularly interested in abandoning optimism. Cautionary impulses aside, I believe that many of the most recklessly optimistic imaginings of our future can be inspiring. I am genuinely excited about this particular time in the history of educational technology.

An Optimistic Turn
Skepticism is, I believe, a sign of thriving health, and given the long-standing tradition of overselling and inflated expectations for educational technology, it serves as a critical check-and-balance. I suggested earlier that one of the values of studying paleofuture artifacts may be to help us recalibrate our contemporary assessments. Perhaps the study of the history of the future cautions us to avoid the hype that so frequently animates technology-fueled visions of the future. It’s impossible to scan the dozens of “in the year 2000” illustrations and miss the unrelenting rosiness of it all, and it’s equally impossible to avoid wondering if we are guilty of the same enthusiasms now.

And yet there is something decidedly infectious about the ebullient optimism evident in predictions of the future. In “Arthur Radebaugh’s Shiny Happy Future,” Novak calls the conviction that technology will create “a leisurely utopian world” of jetpacks, flying cars, and robot butlers a sort of “Technological Manifest Destiny.” Arthur C. Clarke’s 1974 predictions about desktop computing were spectacularly accurate, and even earlier, in 1960, he said with confidence: “The only thing we can be sure of about the future is that it will be absolutely fantastic.”

Who wants to be the curmudgeon to deflate the hope that humanity is striding from one success to the next, always improving—often exponentially—even beyond our imagination?

My own optimistic inclinations are what led me, two decades ago, to teach myself Authorware so I could develop software that would improve my teaching. And yes, it was about efficiency, but it was about my own efficiency as a teacher trying to manage limited time to help my students most, not wigitized efficiency imposed on me. I spent an entire “summer off” creating software to allow me to give my Composition 1101 students more detailed feedback on their composition drafts than I ever could have accomplished by scrawling comments like “unclear” or “awkward” in the margins. Perhaps because my experience with technology was so early in my career and so positive, my practical, positive sensibility has persisted.

Moving from the individual to the institutional level, IT leaders like James Hilton have been a consistent voice for technology transformation and optimism about what higher education can accomplish. When Hilton, dean of libraries and vice provost for digital education and innovation at the University of Michigan, received the 2015 EDUCAUSE Lead-
ership Award, his visionary leadership was singled out as core to his contribution to the community. His featured presentation at our annual conference and his EDUCAUSE Review interview made the case for “reclaiming audacity” in the face of powerful constraints and a context of dynamic and sometimes menacing change. He pointed to space travel as one inspiring point of audacity, no doubt intentionally recalling the moonshot optimism of the early 1960s. Hilton sees Elon Musk as one innovator pointing the way to audacious progress, and Hilton is quick to point out that Musk has staked out ambitious plans in several domains known for struggling with low budgets and high regulation (transportation, energy, and space travel). For Hilton, what should be reclaimed is not just the optimism that new technologies naturally bring forward but also the compelling idealism about access to higher education. Looking to the past for inspiration, he recalls a postwar period when the biologist Norman Borlaug and others were “academic heroes.” Hilton recalls a powerful vision at this time based on the notion that “schools should be incredibly expensive for government and absolutely free of charge for its citizens, just like national defense.”

Hilton’s enthusiasm can be found in many paleofuture artifacts. For example, the December 1901 issue of Ladies’ Home Journal published predictions from John Elfreth Watkins Jr. for the year 2000. Watkins exhibits a similarly irrepressible optimism:

A university education will be free to every man and woman. . . . Poor students will be given free board, free clothing and free books if ambitious and actually unable to meet their school and college expenses. Medical inspectors regularly visiting the public schools will furnish poor children free eyeglasses, free dentistry and free medical attention of every kind. . . . In vacation time, poor children will be taken on trips to various parts of the world.

In this example and elsewhere, optimism often singles out higher education when showing the way toward a brighter future, even in an Arthur Radebaugh picture from 1959 imagining the technology-rich home library of the future (see figure 14). Though this illustration seems to have nothing to do with higher education, the library technology makes it possible to read books that are projected onto, of all things, the ceiling. In this case, the text on the ceiling says: “College training can be had by anybody who truly wants it and can qualify academically. Money need not be a problem if a spirit of sacrifice is accepted. Other obstacles too can be overcome by real determination.” Given the depressing quality of many contemporary characterizations of the value of higher education, this level of unabashed enthusiasm and confidence in the value of a college education is energizing.

What Hilton encourages these days is audacity in our willingness to work together and think big about technology. It’s true that the border between audacity and hype may be in the eyes of a beholder, but as frustrating as unquestioned hype can be, it’s...
impossible to ignore the tremendous promise of education technology tools when it comes to advancing critical areas like student success. In fact, the 2017 EDUCAUSE Top 10 IT Issues list underscores the critical traction that technology offers in this high-priority area. Integrated planning and advising tools, adaptive learning, and other elements of personalization may fall short of the hype they tend to generate, but at the same time they offer unprecedented promise when it comes to moving hard-to-move needles like graduation and retention rates.19

A Meditation

I don’t intend this collection of reflections and ideas to be either a withering critique or a rousing call to action. I mean instead simply to offer a meditation during turbulent times of dynamic change. Pressed on the subject, I would admit that, in the end, I want to have it both ways. I want to acknowledge and encourage a healthy skepticism when our edtech reach exceeds our grasp and when our excitement about the future gets out of control. But I also want us to think big—and dream even bigger.

Ultimately, as I position myself at the crossroads between the past and the future, reflecting on how the future has been imagined in the past, I can’t help but hope for some kind of middle way. I imagine that it is possible that artificial intelligence developments in the years ahead might well improve learning without turning the keys to the kingdom over to “humans are super cool” to holocaust-denying racist in a day.20 I imagine it is possible that personalized and adaptive learning could well preserve that which is sacred in the faculty-student relationship, freeing faculty of transactional matters to focus on what matters most. After all, what I cherish most about the colleges and universities I have attended are the human connections.

I have always believed that we learn the most by asking questions. Understanding our current world by exploring how it was imagined in the past is a thoroughly insightful endeavor because we find ourselves thinking about questions we typically would never ask. Paleofuture artifacts yield up volumes of information about the age that created them and also about the age that interprets them—offering insights that span decades, generations, and even centuries, deepening our understanding of the past, present, and future.

A longer version of this article will be available online in April. The online version contains many more examples, images, videos, and links to sources discussed.

Notes

5. Paul T. Corrigan, “What Did the Future of Learning Look Like 100 Years Ago?” Teaching and Learning in Higher Ed, September 12, 2003; Anya Kamenetz, “Knowledge Pills, Robo-Teachers, Brain Implants and Other Dystopian Edtech,” Digital Ed, March 20, 2014; “Watch Fortune’s Alan Murray Demo a Mind Control Device” (video), Fortune, July 12, 2016; Nicholas Negroponte, “A 30-Year History of the Future” (video), July 8, 2014; Steven Kofer, “Matrix Learning?” Discover, February 18, 2013. Note that in 1960, Arthur C. Clarke also predicted: “We may develop a machine for recording information directly onto the brain as today we can record a symphony on tape. So we may one day be able to become instant experts learning Chinese overnight, for example.” See Clarke, “1960: A Vision of the Future” (video).
7. Peter Bishop, “Can We Teach the Future?” [video], accessed February 4, 2017.
10. Kentaro Toyama, Geek Heresy: Reclaiming Social Change from the Cult of Technology (New York: Public Affairs, 2015). Illustrating his words, when the Los Angeles Unified School District bought iPads for students in 2013, students hacked them for entertainment purposes in less than a week. (Sam Sanders, “Students Find Ways to Hack School-Issued iPads within a Week,” All Tech Considered, NPR blog, September 27, 2013.)
11. This futuristic picture is itself an homage to the distant past. A Western historian looking at this image might instantly recognize that the staves used on these children recall 17th-century “tithing men” in Puritan New England who enforced orders with a “church stick” that had a knob at one end for children and a feather on the other end for adults.
14. Ibid.
17. Ibid.

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John O’Brien (jobrien@educause.edu) is President and CEO of EDUCAUSE.