Venture Ed
Recycling Hype, Fixing Futures, and the Temporal Order of Edtech

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The headlines rang clear: "Teaching Machines—Blessing or Curse?" (Gilmore 1961); "Do Teaching Machines Really Teach?" (Margolis 1963); "Which Is It? New World of Teaching Machines or Brave New Teaching Machines?" (Morello 1965); "Can People Be Taught Like Pigeons?" (Boehm 1960). In the 1960s, various articles in the popular US press underscored the public's growing concerns around what cultural historians characterized as a "boom" in the invention and promotion of teaching machines. Although the development of mechanical teaching devices can be traced back to at least the late 1800s, when patented devices to be used for education began to appear, it wasn't until the mid-20th century that historians note innovations in "teaching machines" had managed to generate a broader "movement" in actualizing wider applications, with national and international conferences held dedicated to new teaching technologies, and both popular and academic publications generating coverage of new research and applications (Benjamin 1988; Ferster 2014; Watters 2014a, 2015).

The National Education Association of the United Stated even published its own volume on *Teaching Machines and Programmed Learning* in 1960—reviewed as "indispensable for any one in the field [and that] will certainly be the major source book for many years to come" (Day 1961)—whose 47 chapters and 724 pages covered a range of commercially available machines (Lumsdaine and Glaser 1960). As the co-editor of the volume, A. A. Lumsdaine wrote in 1961, "The extension and inevitable partial replacement of human functions by the digital computer and similar electronic devices have already begun . . . to revolutionize such diverse aspects of our lives as industrial production and research techniques. This is only a bare beginning. Within a matter of decades it seems likely that . . . the extension of man's intellect through electronics will bring about profound changes in . . . our education system" (1961, 272). And even then, forecasts around the need to "increase greatly the resources and capabilities" of "good teachers" and the "accelerated requirements for a technically capable citizenry" (1961, 272) were the primary grounds on which teaching machines were advocated.

Within general publics, however, among the most frequently repeated preoccupation was the question of how machines would impact teacher retentions and

workload: how, that is, a future of mechanized pedagogy might render educators to be a disposable, increasingly replaceable workforce. "Can Machines Replace Teachers?" (Luce 1960) and "Will Robots Teach Your Children?" (Bell 1961) ran through the headlines, pressing teaching machine advocates to respond. Attempting to assuage concerns in the years preceding the completion of his own famed "teaching machine" in 1953, the Harvard psychologist and inventor B. F. Skinner issued his own, brightened forecast: "Will machines replace teachers? On the contrary, they are capital equipment to be used by teachers to save time and labor. In assigning certain mechanizable functions to machines, the teacher emerges in his proper role as an indispensable human being. He may teach more students than heretofore—this is probably inevitable if the world-wide demand for education is to be satisfied—but he will do so in fewer hours and with fewer burdensome chores" (1958, 976).

Such publicly visible debates, and past prognostications of potential futures, are keen reminders that the current expansion of public and private sector investments in education to promote interactive technologies—from one-to-one student laptop and tablet programs to virtual platforms hosting massive open online courses (MOOCS)—as *the* key to preparing populations for a 21st-century information economy is far from the first revolutionary wave of its kind. Historians, indeed, have noted how various media technologies and "auto-instructional" media (Lumsdaine 1961)—from radio and film to educational television—newly promised to radically transform education when they were introduced into public schools throughout the 20th century (Cuban 1986, 2010; Ferster 2014). Initially presented as means to enhance textbook-based pedagogy with broadcastable instructional content—well suited for "banking" models of instruction that saw students as vessels that needed to be filled and formed (Freire 2006)—over time, they would be hailed for affording new capacities for student input and machine feedback, and for extending never-before-realized interactive capacities that could increase potentials for "customizable" instruction tailored to the personalized needs of individual learners. The promise of such new affordances spurred, too, deep concerns that the fervor for such technologically enhanced capacities could actually realize a displacement of existing teaching professionals. Time and time again, however, the repeated promise of revolution that accompanied the introduction of new teaching technologies would be followed by a later realization of the inability (disappointing to some, relieving for others) to meet elevated expectations.

Perhaps less than seeding a revolution in education, that is, teaching technologies over the course of the 20th century might be better said to accompany performances of a revolution in a perpetual cycle of reboot and delay. As important as the reminder that teaching machines have been among us before is the reminder that the revolutionary futures they assured publics they would bring about—what science and technology studies (STS) scholars have pointed to as the futuristic discourse of hype (Miyazaki 2013; Strathern 2011; Sunder Rajan 2006)—have been with us before too. Such attention to the temporal cycles of repetition and recycled process of hype in relation to teaching technologies shifts attention away from contemporary popular conceptions of hype as accompanying a sudden burst of high-impact innovation and disruptive activity. Yet even as rising concerns *today* around the projected impacts of digital education technologies on teaching and learning practice and labor worldwide echo those of past decades, there

remains a curious lack of any reference to the cycles of project development, elevated expectations, failed futures, and lessons from those not-so-distant past experiments. Indeed, for as expansive as both state and commercial investments worldwide have been in visibilizing new, now often globally expansive contemporary digital education programs—through international conferences, government-launched programs, or elaborately staged education-oriented product launches and campaigns—the recent history surrounding past decades of deployments of educational technologies (or edtech) remains glaringly absent from contemporary accounts, much as the memory of the promise of revolution—and failure to realize projected visions for the creation of expanded value, even when global impacts were foretold—remains curiously absent from the official record as well.

But if the revolution-making promises of teaching technologies have manifested before over the decades[1]—and have done so accompanied time and again by memorable crests of elevated hopes and expanded anxieties—how is it that today they appear to be so easily wiped from memory? How, in other words, have the cycles of pronounced faith and eventual disappointment in teaching technologies and their unrealized revolution been so repeatedly forgettable? So much so that contemporary hype around edtech solutions can manifest now across broad, globally expansive contexts, as if such technologies were the first that had ever proposed to radically transform teaching and learning? And so much so that contemporary popular expressions hype are typically projected onto products of innovation, as if they resulted from a sudden burst of high-impact disruptive activity, rather than being part of a longer trajectory of cyclical fits and starts. Even the vaguest memory of past hyped (and arguably failed) teaching technologies, for instance, would presumably invite a healthy dose of skepticism around—or perhaps even outright rejection of—the asserted promise of contemporary edtech solutions. Yet the logic of hype—or what STS scholars have explored as a "strategic promissory grammar" of hype (Strathern 2011; Sunder Rajan 2006)—that frames edtech's increasingly global solutions today somehow manages to conjure and sustain a pronounced sense of belief, despite the evidence of past records demonstrating that doubt would perhaps be better warranted.

In this chapter, teaching technologies as such sticky objects to cycles of hype and hope—and the historical silences and omissions of memory around past records and evident cases of unrealized promise—are explored as symptomatic of a growing digital age orientation to education that's explored here as one of venture education. Such an orientation, I stress, places explicit value on education as a primary engine for spurring global innovation—even promoting tolerance to high-risk experimentation in educational contexts in the name of optimizing the economic competitivity of diverse populations in the digital age. Taking into ethnographic account the various devices—material, infrastructural, and discursive—constructed to promote global edtech initiatives, this chapter explores how they come to serve as especially productive digital age objects for inviting new engagements from knowledge workers targeted by international educational reform plans. Linked explicitly to high-tech imaginaries and the growing investments of corporate actors in edtech sectors, venture ed relies on shared investments from public and private sector actors. It thus deploys techniques designed to mobilize its imaginary in ways that can register—and resonate—for diversely situated global knowledge workers.

Speculative Futures of Global Edtech

Over the last decade, various studies have underscored how Latin America and the Caribbean have proven to be especially productive terrain for undertaking large-scale experiments with new edtech initiatives (Ames, forthcoming; Andersen 2013; Chan 2014; Medina et al. 2014; Warschauer and Ames 2010), with a World Bank report indicating that some 18 countries in the region had launched one-to-one laptop programs by 2012 alone (Severin and Capota 2011). Promoted explicitly within international policy arenas as global development tools under information and communication technology (ICT) for development (ICT4D) programs, teaching devices demonstrate a utility in enabling contemporary market logics to both *globally* extend and *locally* anchor among diverse knowledge sectors and publics. Much like the market devices that STS scholars and the social studies of finance (Callon 1998; Callon et al. 2007; Mackenzie 2006; 2009; Mackenzie et al. 2007; Mitchell 2005, 2008) studied as "material and discursive assemblages that intervene in the construction of markets" (Muniesa et al. 2007, 2), contemporary *teaching* technologies as devices developed in edtech sectors seek to intervene in the construction of contemporary educational practice and future outcomes.

Indeed, one such site where the interventions of contemporary teaching technologies unfold are the international events and forums, such as the Virtual Educa Conference, that aim to explicitly foster multilateral cooperation in education and innovation. Established in 2000 as an international initiative of the Organization of American States (OAS), the annual Virtual Educa Conference was created to represent an investment in education futures and "A New Educ@tion for a new era." As the secretary general of the OAS, César Gaviria, declared in 2001, shortly after the founding of the initiative, "Virtual Educa is called upon to create new forms of accessing and exchanging information about the technological revolution we're living in now, to establish relationships of cooperation between the educational institutions and private and public sectors." Some seven years later, various regional government heads could be seen affirming the annual conference meeting in its mission, with government representatives including Argentina's minister of education Juan Carlos Tedesco declaring at the opening of Virtual Educa Zaragoza 2008 that "we are aware that this forum of Virtual Educa has become the Iberoamerican event of greatest importance on this topic in discussions and articulations around Information and Communication Technologies and Education."

Indeed, the immediate entrance space for the 2014 Virtual Educa Conference, organized in collaboration with Peru's Ministry of Education and held that year in the typically austere museum space of the nation's Ministry of Culture, provided an immediate visual showcase of new educational technologies that channeled visions of "A New Educ@tion for a new era." An array of corporate sponsors for that year's event—most prominently Intel, Google, HP, Oracle, Telefonica, and Microsoft—filled the open lobby of the Ministry of Culture with elaborate demo spaces, converting the ministry lobby into a buzzing maze of interlinked educational technology product stages. Weaving through the space, one would encounter multiple demo areas, aglow in their stagings of new educational laptops and tablets, instructional software packages, robot kits, digital encyclopedias, and wall upon wall of interactive, flat-screen blackboards. Other sponsors simply erected a mock lounge area, dressed minimalistically with silver-trimmed white leather couches and bar stools that invited attendees to sample their "cloud-based" solutions for schools (including those, apparently, that—as in much of Peru—were

located in rural provinces in the Andes and the rain forest that operated without Internet connectivity). As Peruvian vice president Marisol Espinosa Cruz stated in her opening address to the thousands of attendees for the event, "During [this year's] Virtual Educa, you will have the opportunity to access different plenary sessions and fora themed around education, innovation and competitivity, where the development of new goals and opportunities that technologies offer education, exchanges on practical experiences in education and innovation, and exhibits of the latest generation of information and communication technologies [will be shared]."

While fellow government officials, regional planners from across the region, as well as an array of corporate sponsors were in attendance, it was the public school teachers who had traveled to Lima for the conference, representing hundreds of Peru's urban and rural schools, including from the remote mountain and jungle provinces, who made up the largest sector of the audience—and to whom Virtua Educa's clear theater and staged "performances" of the "latest generation" of ICTs offered for the education sector primarily targeted. And while much work and energy had evidently been invested to construct such an elaborate and extensive display of new educational technologies, what was consistently absent from the staging of such devices, representing the "latest" in education-based innovations, were any reports of past studies that had been completed to indicate findings on degrees of efficacy of *actual* technological deployments and real-world performances in specific learning contexts and local communities. Showcasing an array of the latest innovations presumably too new to have yet been actually tested, Virtual Educa's conference space seemed less concerned with offering information on how such technologies actually performed in context than with creating an occasion to enable such performances to come into being. As science studies scholars Donald Mackenzie and Yuval Millo put it in describing the pointed efficacy of economic models to bring about the market conditions they are meant to only depict, "Economics does not describe an existing external 'economy,' but brings that economy into being: economics performs the economy, creating the phenomena it describes" (Mackenzie and Millo 2003, 108).

Indeed, some of global edtech's most prominent stages were used to platform the message that there was not any need for any studies, evaluations, or even basic information gathering of deployed edtech solutions. Speaking in a September 2009 Interamerican Development Bank forum, Nicholas Negroponte, the founder of MIT's Media Lab and the One Laptop Per Child (OLPC) project alike, insisted that it was so plainly self-evident that laptops would only enhance a child's natural capacity for self-learning that calls to study the early deployments of OLPC in local sites would be a waste of resources. Even as nations, including Peru, were investing millions of dollars in nationally scaled deployments (that in Peru alone would grow to some $300 million), Negroponte flatly dismissed the idea that studies of OLPC's impacts would be revealing: "That somebody in the room would say the impact [of the XO] is unclear is to me amazing—unbelievably amazing. . . . There's only one question on the table and that's how to afford it. . . . There is no other question" (Negroponte 2009; Warschauer and Ames 2010).

While social scientists of finance underscore the persuasive power of highly rationalized market devices and mathematical formulations in economics—such as option-pricing theory and the Black-Scholes-Merton model—to "perform" and actualize market processes in the real world via their ability to affect the perceptions of other legal, political, or financial experts, anthropologist of science Kaushik Sunder Rajan suggests that in contemporary innovation sectors it may be the

performance of market devices within the specific context of speculative markets—where companies face uncertainty and may still be years away from making a tangible product but can drive stock prices "by virtue of promise alone" (2006, 122)—that makes the key difference. Describing the means by which the fevered conditions of hype are fundamental to shaping contemporary innovation sectors, he writes that one can understand emergent technologies under high-tech capitalism only by simultaneously analyzing "the market frameworks" (2006, 33)—that is, public relations strategies, investor relations discourse, and hype within which they emerge. For Sunder Rajan, hype's discursive marketing techniques and apparatuses are not incidental, but are indeed designed, like market devices, to concretely reorder the temporal and material orders and chrono-logics in which they operate: "[Hype is] a game constantly played in the future—to generate the present that enables the future" (2006, 34). Insisting on the indispensable value of such future build-outs, hype operates "as a discursive mode of calling on the future to account for the present" (Sunder Rajan 2006, 116). However distant or out of step the actual present might seem from the eventual future promised, hype urges focused investments of present work and labor in the name of achieving such promise.

Indeed, like a magical electric current, hype and its affect could be felt tangibly coursing through the various glowing demo spaces of Virtual Educa. It was such spaces, excessively outfitted with new technologies, as much as the conference panels and talks themselves that were designed to draw attention. And it was such spaces that undoubtedly drew large, buzzing crowds, filling demo stages to capacity so that the floor—lit up with display after display of new educational laptops and tablets, instructional software packages, robot kits, and interactive, flat-screen blackboards—seemed to literally vibrate with the palpable faith in the suite of edtech solutions and their fantastically rendered techno-futuristic projections of things to come. However out of step such proposed edtech solutions might have been with the real known and lived conditions of the present tense of classroom and teaching contexts across Peru, it was an uncontained optimism that was animated across the various product stages weaving through Virtual Educa, and the public responses it invited. It was as if, for the crowds that swarmed around such displays, even more important than the possibility of being able to achieve such future projections was the ability to stake a claims and place bets on that *particular* vision of the future as worthy of such investments. Or as Sunder Rajan writes, "Excess, expenditure, exuberance, risk, and gambling can be generative because they can create that which is unanticipated, perhaps even unimagined." After all, "[a] vision of that future has to be sold, *even if it is a vision that will never be realized*" (2006, 115).

Edtech's Disremembered Pasts

Beyond the glowing demo spaces of Virtual Educa, in the conference rooms where corporate sponsors and government officials spoke as panelists in presentations to the audience, a distinctly different kind of affect was being summoned—one that was explicitly bleaker, and that relied as much on a temporal projection of heightened risk, disruption, and even destruction as proximate outlooks, as on the glowing promise of edtech as solutions to avert such impending outlooks. Speaking to a literally standing room only audience of Peruvian public school teachers, for in-

stance, Matias Matias of Silicon Valley's Hewlett-Packard explained the company's view on the contemporary challenges of global educators under conditions of the digital innovation in economy: "We've worked in many countries, we've collaborated in many counties . . . and one of the challenges we've seen is that the education system in which we all participate today, in our opinion is a system that's now obsolete. It is not a system that generates talent, nor is it a system for personalized education." He continued by providing disheartening example after another of allegedly failed, ineffective teaching techniques still in use by public educators in classrooms, but then turned pointedly brighter. "But here's the news I am here to deliver: we are here to help you. We are here to support you in this process of technological adoption and practice of teaching. . . . HP turns 75 this year, as one of the world's leaders in technology, and all this experience we bring and make available to you, to change lives and today, to prepare for a better future. So count on us in this transformation!"

It was, indeed, a unique approach to public relations from corporate IT sector actors—who in this case not only seemed untroubled by their direct pronouncements to audiences of working professionals that they were obsolete and working against generating a society of future talent but actually seemed certain there was a virtue in their doing so. When Matias did switch over to a more conventional form of public relations address, to reassure and assuage his audience, he did so by telling them that even if the current education system they participate in is one that's become obsolete, there is at least one resource educators can count on to avert risk: HP and its 75-year history and "experience" as one of Silicon Valley's oldest corporate exemplars. Here, Silicon Valley is summoned as an existing material model whose own presumably self-evident success record is assumed to require little explanation. But Matias's framing of HP turns less on high modernist framings of the company as manifesting a preserved system of high order and rationality, or even about its ability to have leveraged such valued toward new wealth creation. Rather, this narrative turns more on the notion of HP having managed to cultivate a record of growth for nearly a century in the Valley's highly competitive, uncertain, and rapidly changing ecology of technologically paced, high-stakes survival, risk, and extinction. Here, in other words, Matias places his emphasis on the company's long (and unparalleled among Silicon Valley's technology companies) record of proven responsive to conditions of rapid market change and uncertainty. Its ability to become and remain a market leader throughout the sudden technological changes of the 20th century, and its ability to manage the uncertainties of the computing industry for nearly a century, it's suggested, is what makes it an unparalleled ally to confront dynamic change already manifesting in the 21st century's digital economy.

One only has to try to replace HP with a *Fortune* Global 500 company from another sector—from perhaps banking or energy or consumer goods and services—to appreciate the distinctiveness of HP's reception. For whatever symbolic power and global capital is surely shored up in the unique market dominance and recognizability of any *Fortune* 500 player, it's hard to reasonably imagine the same invective being issued from corporate actors of another sector, who could speak on behalf of another clear industry giant whose growth over the past century had made them household names worldwide, without at once expecting that they could be met with at least some degree of indignation or distrust from audiences. IT sector actors today somehow prove the exception, and HP, even following Matias's

declarations of the teaching profession's contemporary obsolescence, was met instead with a roomful of applause.

Matias's chronology was, of course, quite selective about the relevant details it related as 20th-century developments in technology sectors. He left out any mention of how decades earlier, in the mid-20th century, new developments in teaching machines and innovations applied in educational contexts were indeed coming to greater public attention. While historians underscore that development in mechanical teaching devices can be traced back to at least the late 19th century, when patented devices to be used for education began to appear, it was in the mid-20th century that innovations in "teaching machines" began to garner wider public notoriety (Benjamin 1988; Watters 2014a, 2015). Education historian Ludy Benjamin notes that it was in the 1960s that broader public debates could be seen across diverse forums: "National and international conferences were held to discuss the new technology, and popular magazines and scientific journals published news of the emerging research and applications. . . . Interest was shown not only by the educational establishment but also by industry and the military who were especially interested in training application" (Benjamin 1988, 709).[2] Commentary in the popular press, he writes, was frequently cautionary, with articles stressing concerns on the dehumanization of education ranging from the moral and cultural implications of having children taught by machines (Bell 1961; Gilmore 1961) to the question of having people "taught like pigeons" (Boehm 1960) and the question of whether machines could really teach (Margolis 1963). And indeed, among the most frequently repeated preoccupations that teaching machine advocates and innovators were pressed to respond to was the question of how machines would impact teacher retentions and workload—that is, how a future of mechanized education might render a modularized educational workforce—with headlines querying "Can Machines Replace Teachers?" (Luce 1960) and "Will Robots Teach Your Children?" (Bell 1961).

Notwithstanding such concerns around labor and the mechanization of teaching, the promise of such devices on amplifying education's potential had clearly generated a new "movement" for promoting the uptake and invention of teaching machines. Educational organizations including the American Educational Research Association, National Education Association, and American Psychological Association were aware they had to intervene, and collaborated on a joint statement on "Self-Instructional Materials and Devices" in 1961 that stressed the importance of at least providing guidelines and materials to ensure quality teaching and assessment in machine-engaged learning programs in their institutional deployments (American Psychological Association 1961; Benjamin 1988).

A decade later, the "boom" in teaching machines had calmed significantly, as institutions began to encounter barriers to computerizing classrooms. Foremost among these were the persisting lack of guidelines and materials to support programs that ultimately were not "user-friendly" and high costs. Accounts of schools investing thousands with few pedagogical results began to accrue, such as one report of a school district that spent $5,000 on machines and discovered there were no supporting programs available for them (Benjamin 1988). Others machines, lacking curricular support for teaching, came to be seen as little more than toys with limited educational benefits (Weisenberg 1961). And indeed, the decreasing

number of publications on teaching machines further reflected the waning interest. While the *Readers' Guide to Periodical Literature* claims the number of publications in popular literature between 1960 and 1964 at 65, a decade later, from 1970 to 1974, they were down to just 5. Psychological Abstracts followed a similar pattern, where there were 101 citations for 1960–64 and only 15 for 1970–74 (Benjamin 1988). It would take new developments in microprocessors and other components in the late 1970s that would allow fully assembled micro- and personal computers to become more largely available to the general public to overcome such sobering outcomes.

Such historical traces are keen reminders that developments—as well as debates—surrounding teaching machines have histories that long predate the emergence of today's hypervisibilized edtech solutions. The ambitious, explicitly globally ranging digital education initiatives that leverage the growing global accessibility to both personal and mobile computing devices—from the MIT-launched One Laptop Per Child program (that's often been credited itself with spurring global movements for one-to-one-based student laptop plans) to the numerous massive open online course (MOOC) platforms—are among the most prominently narrated and visible inheritors of such layered histories that surround the prior generation's teaching machines. Yet contemporary edtech initiatives make no reference to even the once-celebrated versions of past examples of educational technologies. Now designed to be scaled for deployments that can cover entire national territories, such contemporary teaching technology initiatives tend to stress how their virtual learning environments come ready made for massification, and can overcome the constraints—whether spatial, geographic, economic, or technical—of standard classroom and institutional accommodations. Consistently left unmentioned, however, in their framings and stagings is their connection to and frequent reanimation of prior debates regarding the costs in either labor or financing—to students, teachers, and existing institutions and organizational infrastructures—of such transformations. It was as if such debates had never existed, or as if they had emerged anew without prior histories, records of development, or disappointing outcomes.

Such omitted pasts demonstrate that part of the function of hype in relation to edtech solution is not just about projecting a promissory future, but about seeing to a temporal ordering that can render former failures forgettable, and disguise the recycled performances of hype. Such cleansed pasts around the reality of disappointing outcomes of deployed edtech solutions facilitate the recycling hype as a discursive ground, and the mobilizing of frameworks of innovation and novelty as fundamental narrative elements. But indeed, the work of such devices becomes apparent only when seen or witnessed outside the temporal orderings and architectural stagings of hype. As STS scholars have observed before, as well, such chronological orderings are necessary in order for hype to operate effectively as a discursive apparatus that depends more on effecting credibility than on either promising the truth or attempting to hide an outright lie (Strathern 2011; Sunder Rajan 2006). For all the casual associations of hype with a lie, hype's promoters prove to be less concerned with their proximity to proven truths than with actively graining a certain credibility in the marketplace and confidence among investors and relevant publics. Or as Sunder Rajan writes, "The enterprises that produce fact, evidence, and PR are completely intertwined. This is why dismissing hype as 'simply cynical' . . . [and] not a fruitful way of understanding the mechanisms of its operation. Attributions of cynicism serve to erect a simple binary between the truth and the lie (hype

always being somehow associated, not just typologically but normatively with the lie), a binary that just does not serve to understand the ways in which the truth and the lie are co-constituted as different types of ~~truth~~" (2006, 135).

It's in part because of venture education efforts' need to cultivate faith in the possibility of "different kinds" of credibility among diversely situated publics and investor classes alike that its coordinations between distinct institutions spanning public and private sectors and knowledge- and research-based and industry-centered work become so valuable. Each can work to capture and perform credibility distinctly for their relevant audiences. To the degree that venture ed efforts work toward building and proving "facts," their promoters care less about proving the fact of the efficacy of edtech solutions than about the simple fact of having been able to *visibly and evidently* "capture credibility." As such, captured faith, belief, and credibility among diverse publics perform the realness of edtech and its array of promises.

The varieties of promotional language and strategies that extend from edtech hype thus reflect the targeting of global urban managerial, elite governing classes, and IT industry leaders who might lend financial backing to such projects, as much as educational professionals and broader publics whose faith and enthusiasm for such projects impacts the shape of markets and market valuations around for the edtech sector. Promotional stunts for the OLPC thus infamously included Nicholas Negroponte's promise to, and eventual execution of, air droppings of OLPC tablets to rural villages in Rwanda to demonstrate—he argued—how even without teachers or classrooms, and with only access to the "right" technology, digital literacy could be achieved. The varied private- and public-sector allies to OLPC that bridged tech and global development worlds alike—having been designed by MIT engineers, led by Media Lab founder Nicholas Negroponte, and supported by the likes of Google, Red Hat, and the chip maker AMD—indeed fanned much of the anticipation and excitement surrounding the project. Particularly in Latin America, the project found ready uptake, with nearly 70% of all OLPC's global deployments extending across the continent by 2010, and where states like Peru and Uruguay became rapid partners in ambitious, nationally scaled programs.

Indeed, a similar promise of what OLPC's multisectoral, global private-public partnerships could bring to such international deployment sites as means of transforming national education systems and economies alike arguably helped fuel the popularity of the project among diverse cosmopolitan audiences. In the past several years, multiple OLPC representatives have been regular speakers in the international circuit of TED (Technology Entertainment Design) conferences that are renown for drawing crowds of tech-savvy global professionals, planners, and entrepreneurs. Rodrigo Arboleda, the Colombian-born chairman and CEO for the One Laptop Per Child Foundation, opened his presentation at the 2011 TED conference in Brussels with a short video segment on the Uruguayan Program—and a reminder to his audience of OLPC's commitment to universal inclusion: "The challenge is to not leave people out—and to have every child of primary school age in third world countries have the same opportunities [and] access to knowledge in [the same] quantity and quality as the most privileged child in New York, Tokyo, Berlin, or Brussels. That is the challenge!"

Neither yet the truth nor exactly a "lie," hype stretches toward the ambition of a reality it still can only claim to work toward constituting—a reality that exists in other words as much as fantasy as actual possibility. It thus acts all the while to preempt the potential for failure in the present by fortifying the discursive grounds on

which reality in the future will unfold, using a range of devices and techniques—from educational to tech industry conferences, reports and publications, new channels, and the good will of the audiences and publics they each hail—in order to do so. All this in an effort to register credibility and truth effects for such varied publics. However immaterial they might be, collective faith and belief turn out to be quite bankable investments in venture ed's ecologies of hype, and the work of securing the futures they seek to bring about.

Cleansing Chrono-logics of Hype Cycles

Perhaps one of the clearest indictors of the concrete value placed on hype is the considerable investment business analysts and technology industry actors have made on studying and tracking hype. Probably the most widely cited, watched, and followed studies within tech sectors is the Hype Cycle report annually released by the US research, advisory, and information technology firm Gartner, whose reports have been "evaluating market promotion and perceptions" for over 20 years. Its 2014 report, for instance, included an evaluation of some 2,000 technologies, and came accompanied by an optional document—which Garner charges $495 for—as a guide to help interpret it. As Gartner explained, "The Hype Cycle for Emerging Technologies . . . featur[es] technologies that are the focus of attention because of particularly high levels of hype, or those that Gartner believes have the potential for significant impact. . . . Enterprises should use this Hype Cycle to identify which technologies are emerging. . . . Understanding where your enterprise is on this journey and where you need to go will not only determine the amount of change expected for your enterprise, but also map out which combination of technologies support your progression" (Gartner Newsroom 2014). A flurry of business news outlets, all waiting in anticipation for the report's publication, would distill the report's findings to punchy headlines. When it was released in late 2014, articles from *Forbes* and the *Wall Street Journal*, among others, pronounced in bold headlines that year's takeaway message: "It's Official: The Internet of Things Takes over Big Data as the Most Hyped Technology" (Press 2014).

Arguably, what the report is most famous for—and what many look to the report to see—is Gartner's Hype Cycle Graph: a curious visual element that represents the life cycle stages projected for emerging technologies (see figure 1). It thus charts five essential stages for the more than 2,000 new technologies it now evaluates annually: (1) the Technology Trigger Stage (visualized as a sharply upwardly inclining line), (2) the Peak of Inflated Expectations (visualized as the top of the slope, before a sudden drop), (3) the Trough of Disillusionment (visualized as a valley at the bottom of the drop), (4) the Slope of Enlightenment (visualized as a gently rising slope from the valley), and (5) the Plateau of Productivity (visualized as a flat plane that extends from the rise out of the valley). All its evaluated technologies find a place within the stages of the graph, which—although shaped as more of a sloped line pointing forward than a circle—is nonetheless referenced as "a cycle" by Gartner. The visual emphasis on the graph, however, is undoubtedly on the progressive forward movement and evolution of each technology as it matures toward an eventual Plateau of Productivity over a period that might take five to ten years. As Gartner says, explaining the graph and the work of its report around it, "This report tells a story of how technologies, services and strategies *evolve* from market hype and excitement of value to becoming a mainstream part of business and IT."

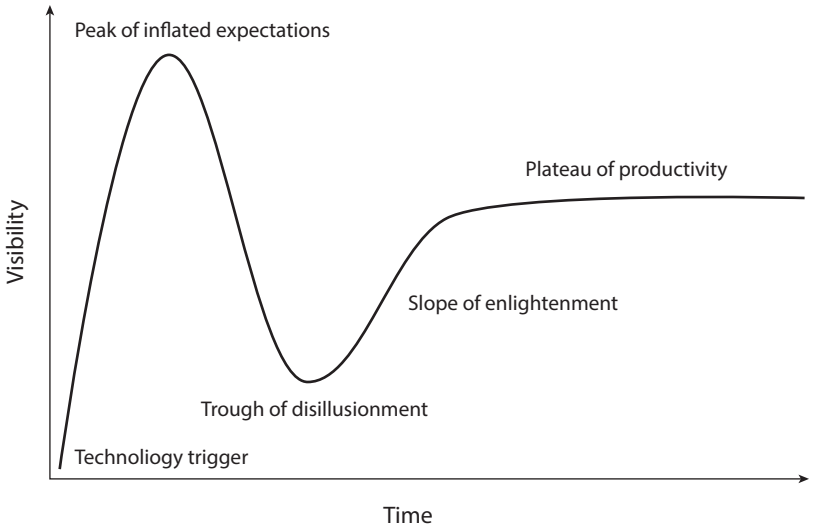

FIGURE 1: Hype Cycle's five stages.

But what's perhaps most interesting about the graph's narrative is its inclusion of a stage of overpromise at all—in the peak of inflated expectations—that's acknowledged as producing an inevitable deflation and a fall into the Trough of Disillusionment. Over time, however, a process of evolution is supposed to occur for each technology that is promised to eventually pass through a Slope of Enlightenment and later enter a Plateau of Productivity. STS scholars indeed have underscored the temporal function of hype and its game-like character: that hype has to overtly oversell the future in order to generate the present to be readied for its making. And yet for all the crucial work of visualization that Gartner's Hype Cycle Graph executes, one other crucial turn appears to occur that's less about visual generativity than about erasure. Once the question of what's missing from hype promoters' narrative becomes introduced, it becomes clear that hype depends not just on an overselling of the future to gain the credibility but also on calls for an explicit devisibilization, or wiping of the past. And once again, such omissions become apparent only when seen or witnessed beyond the border of hype's devices, temporal orderings, and architectural stagings.

Gartner's graph, after all, offers no moment of recollection or reflection. In its only forward-indicating movement, there is no folding back or movement to indicate a reconsideration of a particular technology's relationships to other past projects. And while the discursive and visual technologies the outlined in the Hype Cycle Report—much like the architectural stagings and discursive performances of conferences like Virtual Educa—may offer many projections of *the future*, what's explicitly omitted from all these elaborate investments and staging is any representation of history, whether around particular media and technology projects, their previous deployments, or histories of labor around such projects.

Among the elaborate stagings with their excessively displayed technology models and panels organized for the 2014 Virtual Educa Conference in Lima there was, indeed, no reference to the long history of experiments in teaching machines—whether dating back to 20th-century cases that spanned the "teaching and testing aids" patented in the United States by the Harvard psychologist B. F. Skinner or the

globally deployed edtech initiatives of cases like the PLATO digital computing project that seeded international collaborations for the University of Illinois in the 1960s (Bitzer 1981).[3] Even more surprising was the absence of any direct address to a variety of recent cases of edtech deployments in Peru itself that had immediate relevance to the interdisciplinary, cross-sectoral audiences now routinely present at Virtual Educa's conferences. There was no mention of the fact that Peru, for instance, had a fairly long record of national deployments of digital education projects that included the prominent Plan Huascaran Initiative, launched in 2001, that promised nearly two decades earlier to network rural and urban classrooms alike. And there wasn't even any direct address of OLPC, the $300 million experiment that had been running since 2007 and had distributed nearly a million laptops across the nation, including into many of the classrooms of the hundreds of teachers present at Virtual Educa (Chan 2014).

Instead, the conference was used to announce that a new national edtech project had been designed and would shortly be deployed that would be structured around the Intel Corporation's Classmate computer. With speakers from Intel featured in the conference program—and not just one but multiple demo areas that displayed Classmate computers available for use and testing—Intel's corporate representatives and commercial products alike could appear at Virtual Educa's carefully curated demo spaces as ever-visible and ever-accessible objects. All this for the public school teachers, government officials, and corporate representatives present, whose distinct versions of faith could be hailed as important elements in realizing the nation's future of edtech. And with such an endless sea of new technologies on display, all framed as expressive of the new revolution in education available here for conference goers to get to interact with, what space or time was there to reflect on such mundane considerations as the past?

Conclusion

A consideration of the past waves of teaching technologies and the expansive promises that accompanied them, however, underscores the cyclical form of edtech revolutions that are consistently left out of contemporary venture ed discursive and material performances. As important as the reminder that teaching machines and their related broken and unrealized promises have been among us before, indeed, is the reminder that hype around the revolutionary futures they assured publics they would bring about have been with us before. Omissions of any references to past cycles thus are not merely casual lapses but are key operations to the strategic temporal ordering that hype seeks to effect. Minimizing attention to the temporal cycles of repetition and recycled process of hype in relation to teaching technologies, that is, enables a reinforcement of the perception of hyped technologies as products of a sudden burst of high-impact innovation and uniquely disruptive activity. Such conceptions in turn aid the justification of the expansion of new state and commercial investments in edtech initiatives promoted across a range of international conferences, government-launched national programs, and elaborately staged education-oriented product launches and campaigns that aim to enroll investments of faith and confidence among diversely situated relevant audience.

Much like the forms of 21st-century biocapital logics that anthropologist of science Kaushik Sunder Rajan investigates in global biotechnology industries, venture ed thus proves to be speculative in multiple capacities: partly as an outcome

"of innovative experiments [that] are by definition unknowable, . . . [and where] the market inputs into these experiments are by unknowable," and partly too as an outcome of an "economic regime, overdetermined by the market" that channels the promise of commercial capitalism "almost to the exclusion of commodity capitalism" (2006, 111). That is, faith can be sustained and recaptured around edtech's proposed solutions—even at global scales—despite explicit failures to develop new and sustained value, or the absence of a working product of tested commercial value. Indeed, part of what makes teaching technologies associated with venture ed such curious objects of study has been their apparent stickiness as objects of expanded hope and hype across time and global terrains—as objects that have evidenced a certain resistance to cultivating disbelief, and that instead prove to be especially friendly (perhaps uniquely so) to resurrected cycles of internationally expansive hype. And without doubt, part of what appears to have enabled such notable capacities for recycling hype involves a dually oriented temporal ordering of teaching technologies: not only their ability to reanimate spectacular, promise-filled futures (Strathern 2011; Sunder Rajan 2006), but their ability to continually cleanse, expunge, and forget—rather than perhaps repurpose—disappointment in the actual past.

STS scholarship, however, has also gestured toward how mechanisms of hype—perhaps especially given its cyclical form—might be recycled and repurposed to other ends. Under such means, the past—even past records of failure and disappointment—could be framed as something other than obstacles to the presumed productivity and generativity of the "new." Instead, the past could be seen as a productive resource for imagining the present and future as otherwise. Even if hope—and hype—might be posed as oppositional frames to the work of critical scholarship, an "endpoint"—which indicates the moment when a project at last becomes retrospectively considered—opens the possibility of creating a moment too when the failure to realize projected promises could be made known and apprehendable (Miyazaki and Riles 2005). Marilyn Strathern thus underscores how in academia explicitly interdisciplinary projects frequently come to a "closure" when new partnerships fail, but that such closure is one that's realized as "only patchy." Thus, "as much as at its formal end, an identifiable shortfall [in a project] may turn into a tool for public evaluation, becoming a mark of internal criticism to the benefit of the rest of a project. . . . Disappointment in some elements of the project can work to reinforce hope in other elements" (Strathern 2011, 273).

This would require, however, a willingness of multiple sectors invested in venture ed to step outside the discursive terrain of hype and adopt an explicitly "retrospective" stance, characteristic of "contemplative knowledge" (Miyazaki 2004, 10). Such a retrospective orientation indeed becomes especially challenging in high-tech innovation fields that operate according to the temporal demands of continual high-stakes production, risk, and speculation. And the temporal conditions and demands for acceleration appear to produce further challenges for the work of critique. For while such retrospective orientations are continually necessary to press for, in the meantime it's become clear that a new generation of edtech tools and techniques is already drawing heated critique from educational practitioners concerned with the expanded ethical complications already evident in their early deployments. Of explicit concern for critics is how digital interactions in newly deployed edtech programs are being treated as means to generate new forms of information goods and digital commodities. These result in the collection and mining of data around teacher and student performances, and the quantifica-

tion of learning assessments that massified digital interactions enable. Such calculations in contemporary education markets today enable powerful tools to allow micro-targeting decisions to be made on precisely where investments should be made, and where they should be withdrawn.

Aware that such new trends have begun to define educational technology markets even before they've begun to be generally perceived by the general public—and especially the vast majority of students and teachers they directly impact—education historians such as Audrey Watters have worked to underscore how increasingly today "education technology has become about control, surveillance, and data extraction" on participating actors shaped by the logics of venture ed. Human capital cultivated with the affordances of contemporary educational technology environments, that is, can be optimized as much via strategies of mining value from future human workers—produced *over the long term*—through contemporary educational technology investments and architectures, as through *immediate* value extractions strategies enacted via instantaneous data collections and calculations on current students' (and future workers') interactions within such digital architectures. As Watters writes, "Increasingly, education technology works in concert with efforts—in part, demanded by education policies—for more data. We hear these assertions that more data, more analytics will crack open the 'black box' of learning" (Watters 2014c). She cites among those making these claims most loudly as heads of educational data mining companies such as Knewton, a company that partners with educational institutions and textbook publishers to make content delivery "adaptive" and "personalizable" for individual students, gathering millions of (as it claims) "actionable" data points on millions of students worldwide each day. CEO Jose Ferreira calls education "the world's most data-mineable industry by far." As he boasted at the 2012 "Datapalooza" event, organized by the US Department of Education, "We have five orders of magnitude more data about you than Google has. . . . We literally have more data about our students than any company has about anybody else about anything, and it's not even close. . . . We literally know everything about what you know and how you learn best, everything" (Hill 2014; Ohanian 2014).

Ferreira, indeed, was only one among 150 leading entrepreneurs, software developers, policy makers, and education experts—key players in the growing educational technology software segment whose sales last year rose to nearly $8 billion, according to the Software and Information Industry Association—brought together for Datapalooza. And although messages like Ferreira's (and likely those of other product vendors at the event) stressed the new flood of "actionable" data the future promises to unleash, that prospect was framed against another, arguably more foundational message—one that began the event itself—on the sobering "reality" faced by educators today. As then secretary of education Arne Duncan stated after describing the quality of education as desperately subpar, "The factory model of education is the wrong model for the 21st century. . . . Our schools must . . . do far more to personalize instruction." And he minced few words in telling his audience that current methods and resources, including textbooks, "should become obsolete . . . as fast as we can" make it (Harber 2012).

Watters highlights that in such conditions, assessment and valuation can become rapidly economized—and turned into data calculations enabled and accelerated by new educational technology interactions. And although still largely unmentioned, the question of labor and of human capital in formation—both that of educators and now too of students—becomes key. As she writes, "Students' labor—students' test results, students' content, students' data—feeds the measurements used to

reward or punish teachers. Students' labor feeds the algorithms—algorithms that further this larger narrative about teacher inadequacies, sure, and that serve to financially benefit technology, testing, and textbook companies, the makers of today's 'teaching machines'" (Watters 2014b). Which leads one to suspect that perhaps the most effective market devices are the ones you never could have remembered were worthy of suspicion to begin with.

Notes

1. The mid-20th-century excitement around teaching machines eventually calmed by the mid-1970s, as institutions began to encounter both high costs and the persistent lack of guidelines and materials to support programs that were neither "user-friendly" nor effective in producing clear outcomes as major barriers to computerizing classrooms (Benjamin 1988).
2. A survey of the *Readers' Guide to Periodical Literature* shows two citations for teaching machines prior to 1959; both were articles authored by Skinner. For 1959–60, there were 20 articles in popular magazines and another 31 in 1961–62. A similar trend can be seen in the scientific literature where "teaching machine" was initially used as an index term in the 1960 volume of *Psychological Abstracts*, which listed 12 entries. In 1961, that number increased to 20, and the following year to 24 entries.
3. The international collaborations were in Germany and South Africa.

Works Cited

American Psychological Association. 1961. "Self-Instructional Materials and Devices." *American Psychologist* 16 (8): 512–13.

Ames, Morgan G. Forthcoming. *The Charisma Machine: The Life, Death, and Legacy of One Laptop Per Child.* Cambridge, MA: MIT Press.

Andersen, Lars Bo. 2013. "A Travelogue of 100 Laptops." Doctoral thesis, Aarhus University.

Bell, J. N. 1961. "Will Robots Teach Your Children?" *Popular Mechanics*, October, 153–57, 246.

Benjamin, Ludy T. 1988. "A History of Teaching Machines." *American Psychologist* 43 (9): 703–12.

Bitzer, Donald. 1981. Interview with the Charles Babbage Institute, November 2.

Boehm, G. A. 1960. "Can People Be Taught Like Pigeons?" *Fortune*, October, 176–79, 259, 265–66.

Callon, Michel, ed. 1998. *The Laws of the Markets*. London: Blackwell.

Callon, Michel, Yuval Millo, and Fabian Muniesa, eds. 2007. *Market Devices*. Malden, MA: Blackwell.

Chan, Anita Say. 2014. *Networking Peripheries: Technologies Futures and the Myth of Digital Universalism.* Cambridge, MA: MIT Press.

Cuban, Larry. 1986. *Teachers and Machines: The Classroom Use of Technologies since 1920*. New York: Teachers College Press.

——. 2010. *Oversold and Underused: Computers in the Classroom.* Cambridge, MA: Harvard University Press.

Day, Jesse H. 1961. "Teaching Machines and Programmed Learning." *Journal of Chemical Education* 38 (5): 275.

Ferster, Bill. 2014. *Teaching Machines: Learning from the Intersection of Education and Technology.* Baltimore: Johns Hopkins University Press.

Freire, Paulo. 2006. *Pedagogy of the Oppressed.* 30th anniversary ed. New York: Continuum.

Gartner Newsroom. 2014. "Gartner's 2014 Hype Cycle for Emerging Technologies Maps the Journey to Digital Business." August 11. www.gartner.com/newsroom/id/2819918.

Gilmore, K. 1961. "Teaching Machines—Blessing or Curse?" *Science Digest*, February, 76–80.

Harber, Jonathan. 2012. "Datapalooza: A Game Changer for Education?" Pearson Research & Innovation Network. http://researchnetwork.pearson.com/digital-data-analytics-and-adaptive-learning/datapalooza-a-game-changer-for-education.

Hill, Adriene. 2014. "A Day in the Life of a Datamined Kid." *Marketplace*, September 15. www.marketplace.org/topics/education/learningcurve/day-life-data-mined-kid.

Luce, G. G. 1960. "Can Machines Replace Teachers?" *Saturday Evening Post* 36–37:102, 104–6.

Lumsdaine, A. A. 1961. "Teaching Machines and Auto-Instructional Programs: A Rationale of the Media and Analysis of the Programs." *Educational Leadership* 271–77:314.
Lumsdaine, A. A., and Robert Glaser, eds. 1960. *Teaching Machines and Programmed Learning.* Washington, DC: National Education Association.
Mackenzie, Donald. 2006. *An Engine, Not a Camera: How Financial Models Shape Markets*. Cambridge, MA: MIT Press.
——. 2009. *Material Markets: How Economic Agents Are Constructed.* Oxford: Oxford University Press.
Mackenzie, Donald, and Yuval Millo. 2003. "Negotiating a Market, Performing Theory: The Historical Sociology of a Financial Derivatives Exchange." *American Journal of Sociology* 109:107–45.
Mackenzie, Donald, Fabian Muniesa, and Lucia Sui. 2007. *Do Economists Make Markets? On the Performativity of Economics.* Princeton, NJ: Princeton University Press.
Margolis, R. J. 1963. "Do Teaching Machines Really Teach?" *Redbook* 51:98–99.
Medina, Eden, Ivan da Costa Marques, and Christina Holmes, eds. 2014. *Beyond Imported Magic: Essays on Science, Technology, and Society in Latin America.* Cambridge, MA: MIT Press.
Mitchell, Timothy. 2005. "The Work of Economics: How a Discipline Makes Its World." *European Journal of Sociology* 46:297–320.
——. 2008. "Rethinking Economy." *Geoforum* 39:1116–21.
Miyazaki, Hirokazu. 2004. *Search Results The Method of Hope: Anthropology, Philosophy, and Fijian Knowledge.* Stanford, CA: Stanford University Press.
——. 2013. *Arbitraging Japan: Dreams of Capitalism at the End of Finance.* Berkeley: University of California Press.
Miyazaki, Hirokazu, and Annelise Riles. 2005. "Failure as an Endpoint." In *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*, edited by A. Ong, S. Collier, 320–31. Oxford: Blackwell.
Morello, T. 1965. "Which Is It? New World of Teaching Machines or Brave New Teaching Machines?" *UNESCO Courier*, March, 10–16.
Muniesa, Fabian, Yuval Millo, and Michel Callon. 2007. "An Introduction to Market Devices." In *Market Devices*, edited by Fabian Muniesa, Yuval Millo, and Michel Callon, 1–12. Malden, MA: Blackwell.
Negroponte, Nicolas. 2009. "Lessons Learned and Future Challenges." Speech at Reinventing the Classroom: Social and Educational Impact of Information and Communication Technologies in Education Forum, Washington, DC, September 15.
Ohanian, Susan. 2014. "An Update on Datapalooza at the U.S. Department of Education." *Substance News*, August 3. www.substancenews.net/articles.php?page=5135.
Press, Gil. 2014. "It's Official: The Internet of Things Takes over Big Data as the Most Hyped Technology." *Forbes*, August 18. https://www.forbes.com/sites/gilpress/2014/08/18/its-official-the-internet-of-things-takes-over-big-data-as-the-most-hyped-technology/#3fd1f83f3aca.
Severin, Eugenio, and Christine Capota. 2011. "One-to-One Laptop Programs in Latin America and the Caribbean: Panorama and Perspectives." Inter-American Development Bank Publications. http://publications.iadb.org/handle/11319/4919?locale-attribute=en.
Skinner, B. F. 1958. "Teaching Machines." *Science* 128:969–77.
Strathern, Marilyn. 2011. "An Experiment in Interdisciplinarity: Proposals and Promises." In *Social Knowledge in the Making*, edited by Charles Camic, Neil Gross, and Michelle Lamont, 257–84. Chicago: University of Chicago Press.
Sunder Rajan, Kaushik. 2006. *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke University Press.
Warschauer, Mark, and Morgan Ames. 2010. "Can One Laptop Per Child Save the World's Poor?" *Journal of International Affairs* 64 (1): 33–51.
Watters, Audrey. 2014a. "The History of Personalization and Teaching Machines." *Hack Education*, July 2. http://hackeducation.com/2014/07/02/personalization-teaching-machines/.
——. 2014b. "Teacher Wars and Teaching Machines." *Beacon Reader*, September 21. www.beaconreader.com/audrey-watters/teacher-wars-and-teaching-machines.
——. 2014c. "Convivial Tools in an Age of Surveillance." Talk delivered at NYU Steinhardt Educational Communication and Technology Colloquium Series, November 13. http://hackeducation.com/2014/11/13/convivial-tools-in-an-age-of-surveillance/.
——. 2015. "The First Teaching Machines." *Hack Education*, February 3. http://hackeducation.com/2015/02/03/the-first-teaching-machines/.
Weisenberg, C. M. 1961. "Teaching Machines." *Commonwealth*, January 27, 454–56.