

Book Reviews

happened in just the last ten years. Hearing the anecdotes of back-office meetings, public outcries, and false claims was intriguing. If you, like me, wonder how we got to where we are today in the area of AI, this is the book for you.

Reviewed by Victor T. Norman, Assistant Professor of Computer Science, Calvin University, Grand Rapids, MI 49546.

TEACHING MACHINES: The History of Personalized Learning by Audrey Watters. Cambridge, MA: The MIT Press, 2021. 313 pages. Hardcover; \$34.95. ISBN: 9780262045698.

Teaching Machines, by freelance writer, researcher, and technology commentator Audrey Watters, is a history framed by a critical rallying cry. The main body of the book is a history of the development and demise of “teaching machines” (mechanical devices for self-paced, programmed instruction) from the 1920s to the 1960s. It attends closely to the extent and limits of the influence of B. F. Skinner (and his forerunner Sidney Pressey), the role of commercial interests and processes, the development of a receptive social imaginary through popular media, the inconclusive nature of empirical findings about the learning that resulted, the eclipse of the mid-century teaching machine by programmed learning in book form, and the rise of computers. This account by itself might seem a little arcane. It is, however, given added heft by a framing argument that ties the history of teaching machines to present-day trends, and critiques some common myths regarding the history of educational technologies that are used to sell current technological options. This framing argument contends, on the one hand, that the “Silicon Valley mythology” (p. 249), regarding education’s digital future, rests on misinformation about the past, and, on the other hand, that current digital developments have more continuity with the behaviorist and totalitarian impulses of that past than is commonly admitted.

Concerning the former point, Watters points to a common narrative purveyed by figures such as Sal Khan and Bill Gates that presents education as beset by a static factory model rooted in the nineteenth century and buttressed by resistance to change on the part of Luddite educators. The solution then comes in the form of commercially sourced digital tools that now offer revolutionary degrees of individualization and access to learning. Watters’s account undermines both halves of this story. She marshals a substantial body of evidence to show that education has been far from static over the past century, that techno-

logical innovations designed by educators regularly stalled due to inertia and disorganization on the part of the business world, and that the rhetoric of revolutionary individualization and personalization of learning has been the stock-in-trade of purveyors of a long string of new educational technologies but has also consistently fallen short in practice. A generous amount of space is devoted to B. F. Skinner’s bouts of epistolary fury directed at his business partners who stalled development of his teaching machines until their moment had passed. More significantly, Watters makes clear that the recurring claim of individualization came within a recurring and expanding envelope of standardization. Proponents of teaching machines made much of the potential for individualized instruction, understood as the capacity for learners to proceed at their own pace. Those same learners were expected to follow programmed sequences, assemble predetermined atoms of knowledge, prepare for standardized tests, and submit to a rather deterministic process of behavioral manipulation. The talk of individualization may perhaps have been sincere, but it amounted in the end to something comparable to today’s processes of “personalizing” your smartphone by choosing the same device as millions of others in one of a handful of colors, or perhaps clicking on the same online instructional video, framed by the same perspective, as everyone else. In the meantime, the appeal to individualization helped to shift product.

The suggestion of contemporary parallels points to the second part of the book’s framing agenda, which claims that teaching machines were not just a curious episode that met its demise with the rise of computing. Watters points out that claims to revolutionary breakthroughs in education through technology commonly end up looking oddly conservative. Dreams of technocratic learning and robot teachers in the 1950s and 1960s still placed the robots in front of classrooms with rows of chairs in which students answered multiple-choice questions. Watters suggests that contrary to some tellings of the story, the teaching machines of the day did not give way to computers so much as help to establish assumptions about programmed learning rooted in behavioral manipulation, atomization of content, and linear progress that continue to inform today’s digital educational technologies. The commercial involvement in all of this is, moreover, far from disinterested, with considerable research and design acumen going into the creation of digital products that reinforce behaviors favorable to those who make their living from eyeballs remaining on webpages and apps. After a

chapter starkly comparing the Skinnerian vision of education based on control through behavioral engineering to protests from figures such as Freire and Chomsky in the name of freedom, Watters wonders aloud in the concluding chapter whether the quaint teaching machines of yore were just setting us up for a larger-scale loss of freedom in the name of surveillance capitalism, a loss sold under the aegis of the latest reiteration of educational utopia based on individualization.

The book is engaging, well written, and highly readable. Its deconstruction of the popular narratives about technology and education that it targets is persuasive, patient, and useful. For a book that ultimately has some larger points to make, it narrates the history carefully and in a measured tone. The concluding argument about the continuities between Skinnerian teaching machines and the mechanisms of surveillance capitalism rings true, but comes as a bigger leap given that all of the detail is focused on the decades between 1920 and 1970, after which we race somewhat headlong to the present in a welter of telling one-liners from various authors. That there are family resemblances between now and then seems undeniable based on the evidence presented, but detailed lines of descent are less clearly established. One also wonders whether the key opposition of totalitarian control versus radical individual freedom is quite adequate to do justice to the landscape. The closing sections are a little broad-brush, but certainly well worth pondering. The book is recommended reading for anyone interested in technology's relationship to society and education, and for anyone who imagines that educational technologies are just tools for making schools better.

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SCIENCE FICTION by Sherryl Vint. Cambridge, MA: The MIT Press, 2021. 224 pages. Paperback; \$15.95. ISBN: 9780262539999.

Science Fiction is the story of the romance between fiction and science. The goal of the book is not to define the history or essence of science fiction, but rather to explore what it “can do” (p. 3). How does fiction affect scientific progress? How does it influence which innovations we care about? In the opposite direction, what bearing does science have on the stories that are interesting to writers at a point in time? *Science Fiction* references hundreds of books to paint a cultural narrative surrounding science fic-

tion. Throughout the book, Vint refers to the fiction as ‘sf’ in order to avoid distinctions between science fiction and speculative fiction. The dynamic between science and fiction is a relationship defined by both scientific progress and by forming judgments of the direction of development through a lens of fiction. Fiction is cause and effect; we use fiction to reflect upon changes in the world, and we use fiction to explore making change.

Vint, Professor of Media and Cultural Studies and of English at the University of California, Riverside, gives overviews of different areas of sf. These include some of the most common sf elements, such as utopias and dystopias (chap. 2), as well as relatively recent concerns, such as climate change (chap. 7). Through these questions, she is navigating one question: how does sf engage with the world? It is more complex than the commonly reflected-upon narrative that sf is an inspiration to inventors—it is a relationship moving in both directions and involves value judgments as well as speculation about scientific possibilities.

The book also navigates the attitudes at the root of sf. Vint presents sf as a fundamentally hopeful, perhaps even an optimistic, genre. She describes sf as “equally about frightening nightmares and wondrous dreams” (p. 13). Yet even dystopian stories require hope for a future. Showing the world gone wrong still requires “the seeds of believing that with better choices we might avoid these nightmares” (p. 32). This is certainly true in the discussion of climate change sf. Where nonfiction writing often focuses on the impartial mitigation of disasters, the heart of fiction offers “the possibility to direct continuous change toward an open future that we (re) make” (p. 136).

The most surprising chapter is the penultimate one, focusing on economics (chap. 8). Vint discusses the recent idea of money as a “social technology” (p. 143) and the ways our current economy is increasingly tied to science, including through AI market trading and the rise of Bitcoin. The chapter also focuses on fiction looking at alternative economic systems—how will the presence or absence of scarcity, altered by technology, change the economic system? Answers to this and similar questions have major implications on the stories we tell and the way we seek to structure society.

As Christians, we have stories to help us deal with our experiences in life and our hope for the future. *Science Fiction* discusses sf as the way that our