Critical Failure:
Computer-Aided Instruction and the Fantasy of Information

In the pages of this journal, Joy Rankin called for a history of social computing, encouraging historical scholarship to examine not only the successive engineering feats that produced modern computers, but also "the activity of computing as a social and cultural phenomenon."[1] Central to this pursuit would be "an important but little studied area," the history of education and computers. This project might include records of educational computing projects (such as PLATO, the computer system that Rankin wrote about), software and logs created by students across various sites, and exploration of the range of conflicting meanings ascribed to computers and computing.[2] In what follows, I take up the last part of this challenge by asking about a central component of the meaning of social computing: the persistent vison of radically improving education through various forms of "computer-aided instruction." Just as the promise that computers will radically change education for the better has persisted for decades, so to have constant, bitter reports of the failure of computers to make good on this promise. The history of the use of computers in education is a story that oscillates between triumphant declarations of the arrival of an imminent future and equally vehement announcements of present failure.

Experts and hucksters alike have attempted to replace the teacher, the book and the chalkboard as the primary media of education for much of the 20th century.[3] Early adopters of radio, then motion pictures, then television all claimed to be on the cusp of reforming instruction based on a new kind of educational media. These attempted transformations never quite happened and these new forms of media gradually found their places as *supplements* to human-led, bibliocentric, face-to-face instruction. For over half a century, computers in various

configurations have continued to promise a change in instruction that never happens (the year of the Massive Open Online Course was six years ago, if anyone cares to remember[4]). According to one popular explanation, the tenacity of the vision of computer instruction is a feat of marketing. In this view, computers traveled from their industrial contexts into schools and homes via successive waves of engineering advances, ever-cheaper and more powerful products, and canny manipulation of consumer sentiment.[5] In this telling, technology goes where advertisers direct. That consumer culture trades in affect and sentimental relationships to products and brands cannot be denied.[6] But decades before there were any products to be marketed to the general public, computers were already educational. In a 1965 address to the American Federation of Information Processing Societies (predecessor of the IEEE), Ralph. W. Gerard, Dean of The Graduate Divisions of the newly formed University of California, Irvine described a "tremendous opportunity for the future" predicated on the unison of the human mind and the useful but limited capacities of computers:

> What we are really facing, of course, is a symbiosis of both, combing the attributes of great speed and vast memory of the idiots that we call computer systems with the imaginative, creative, idiosyncratic, pattern-forming capacities of the human brain and mind.[7]

As Gerard saw it, individualized curriculum delivered via timesharing terminals would save money and allow university education to scale up to meet the demands of a growing population. Gerard's talk takes up key ideas in a longer history of twentieth-century speculative technological projects, a heritage that connects Vannevar Bush's vision for the memex, an educational machine that could retrieve scholarly knowledge automatically;[8] Paul Otlet and Henri la Fontaine's establishment of the Mundaneaum, an archive and index of all the world's knowledge to be accessible via telephone and telegram;[9] and H.G. Wells' World Brain, a

"Permanent World Encyclopedia" to be printed on microfilm.[10] It is from the lineage of these fantastic machines that computers came to be viewed as useful idiots ready to automatically (and cost effectively) take up labor-intensive forms of library work, effortlessly precise information retrieval, and automatic education.

Before personal computers were marketed successfully to the general public, microcomputers of various kinds had already been placed in affluent public schools. Bill Gates learned to program in BASIC on a machine at his high school.[11] Steve Jobs and Stephen Wozniak learned about electronics and started building computers in the schools of Cupertino, California.[12] In 1976, before it had much of anything to sell, Apple Computer, Inc.'s. Corporate Objectives stated:

> We also feel that Apple can contribute in certain special ways due to the unique nature of our products; i.e., improving the educational process through the use of small computers.[13]

By 1980, these "special ways" had already become ingrained in popular perceptions of computers. Apple famously marketed its products to public schools, but this strategy could not have succeeded without citing an extant understanding of what computers could do and be.[14] Journalism, social science, film, television, and advertising train the public to interpret consumer technology when its associations and valences are in flux.[15] These media tapped into existing fantasies (and anxieties) about computing and simultaneously stabilized a horizon of intelligibility around an exoteric object. Early advertising for personal computers positioned these newly available machines as both the means to accomplish white collar affluence and the tool by which work and leisure would be effected. The personal computer then became both symbol and medium of the information age, a clever compression of the idiosyncratic worlds of

knowledge, leisure, work, play, research, and finance into the space of information.[16] An all-purpose machine for an all-purpose concept.

A stark counter-discourse of failure animates the history of computer-aided instruction in both popular and academic accounts. In a matter-of-fact dismissal of technological solutionism written in 1995, Alfred Bork — physicist, computer scientist, and foundational figure in the design of interactive, educational multimedia — asked, "Why Has the Computer Failed in Schools and Universities?"[17] Building on decades of research and teaching, Bork leveled a stern indictment of the state of the art of computer-mediated pedagogy by insisting, "We could have rebuilt education with technology many years ago."[18] Bork's complaint identified several culprits, including an emphasis on hardware rather than on learning or students; "elitist" software designed exclusively for expert users; and the pointless pursuit of innovation. Bork's broadside placed blame not on machines themselves, but on humans who refused to take advantage of the beneficial aspects of computers, their power, their organization, their logic. In this version of the story, it is humans who have become idiots by missing out on an essential quality of computers that could transform teaching and learning for the better, if only humans would get with the program.

Bork's fiery editorial evokes a feeling of world-weariness, a sense of fatigue at being forced to point out what is so indisputably self-evident. If the accomplishment of this self-evident link between computers and their value in instruction predates the birth of the personal computer, it has also survived its demise. For several years, I studied an attempt to use successors to the personal computer in urban education. During a period in 2013 – 2015, many schools in Southern California that serve minoritized communities, primarily Black and Latino, set out to provide every teacher, student and administrator with a tablet computer to "close the

digital divide and level the playing field, not only with educational access but technological access."[19] What is most striking about these projects is how insistently they call back to Apple's "special ways" of making education better, and also to Bork's insistence that machines, if let to do their work, could correct troubled schools. What these attempts to introduce a certain kind of computing in the poorest schools of Los Angeles produced was spectacular failure, one imputed not to tablet computers, but to the schools who refused to use them correctly.[20] This points to the importance of the ever-changing material forms of information and media technology, a way they have of keeping themselves new.[21] But the persistence of the commonsense assertion that computers in any form can reinvent instruction also points to a willful, collective suspension of disbelief.

Public failure of a technological project is a moment ripe for analysis, a way "to think of the social in terms of unfinished stories."[22] In the case of computers applied to education, failure has a way of reinforcing a story about how improvements in computer technology turn into improvements in society, despite all evidence to the contrary. At stake in the always unfinished project started by Gerard, Gates, Jobs, Wozniack et al. and kept alive by Bork and *Wired* magazine is not just the promotion of any particular regime of computing in instruction (since many kinds of computers and devices are already collecting dust or waiting for repair in any given school), but the belief that the world can be organized and improved by computing. The "special ways" that computing can improve work, school, government, and play are norms built on a decidedly narrow conception of information, a progressive and optimistic vision that takes the natural sciences as an exemplar for all forms of knowledge transmission and communication. Computers and education are only "made for each other" (as Bork put it) in a cosmology where the world is made of information, that banal and mysterious ether that is both fuel and precipitate

of global capitalism. The trope of failure, is, in short, symptomatic of a powerful fantasy that subsumes all actual and potential human knowledge into flows of machine-readable information. In such a vison, it is only a matter of time before all learning and thought become informational, despite the constant refusal of the world to conform to this structure.[23] If we recognize that very little of life resembles information processing, the social history of computing might suggest that it is the foundational myth of information that has failed rather than humans or machines alone.

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