1-1-2003

Rebooting the Promise of Technology in the Classroom: Review of *Oversold and Underused: Computers in the Classroom* by Larry Cuban

Heidi Schweizer  
*Marquette University, heidi.schweizer@marquette.edu*

Carrianne H. Hayslett  
*Marquette University, carrianne.hayslett@marquette.edu*

Robert Lowe  
*Marquette University, robert.lowe@marquette.edu*

BOOK REVIEWS


Reviewed by: Heidi Schweizer, Carrieanne Hayslett, and Robert Lowe, Marquette University

REBOOTING THE PROMISE OF TECHNOLOGY IN THE CLASSROOM

Reform has become as much a hallmark of American education as tests and textbooks. Ever since schooling developed into a central feature in children’s lives and an undeniable force in shaping the opportunities of adults, making schools “better” has been a preoccupation of policy makers. Despite a seemingly unending parade of ways to improve instruction and periods of intense interest in significantly changing classroom practice, relatively few educational reforms have had long-lasting effects or done much to distinguish the classrooms of the early 21st century from the classrooms of the early 20th century. The limits of educational reform, evident in the “apparent uniformity of instruction over time” and “the apparent invulnerability of classrooms to change” (Cuban, 1984, pp. 1, 2) have long been a concern of Larry Cuban’s scholarship. He has emphasized the institutional contexts in which teachers work, the tradition-bound nature of schools, and the exclusion of teachers’ voices from reform movements. To the extent that instructional change has taken place, according to Cuban’s path-breaking How Teachers Taught (1984), it has been the result of “situationally constrained choice,” as teachers have acted on their own beliefs about teaching while navigating limits imposed by the organization of schools and classrooms.

Reformers often have touted technological innovation as the key to transforming classroom practice. In Teachers and Machines: The Classroom Use of Technology Since 1920 (1986), Cuban examined forms of educational technology that preceded the computer. In this analysis of the use of radio, film, and television by teachers, Cuban discerned a cyclical pattern to the introduction of technology into schools. This cycle was marked by expenditures by school boards—with little
or no input from teachers—to acquire these new technologies, followed by limited use by teachers—save a few “innovators” and “early adopters”—with eventual penetration of these technologies into common teaching practice where they were used to support existing methods of instruction. Based on his analysis of the use of media, Cuban predicted that future computer use would not exceed 10 percent of weekly instructional time in elementary classrooms and 5 percent in secondary schools. He foresaw labs and elective classes as the most likely homes for computers, and he further believed that a few highly motivated teachers would make innovative use of computers while most, at best, would adapt computers to their existing classroom practice. Fifteen years later, maintaining his eye on educational reform, Cuban has returned to assess classroom use of computers in *Oversold and Underused: Computers in the Classroom* (2001).

The central question in *Oversold and Underused* is whether the investment in education technology has been worth it. As the title implies, Cuban thinks not. He arrived at this conclusion by testing the claims of those who maintain computer technology will transform education against a multi-faceted inquiry into the use of computers in various Silicon Valley schools, including several early childhood institutions, two high schools, and Stanford University.

Cuban studied 11 preschool and kindergarten classes at seven sites with varying socioeconomic configurations. He interviewed students and teachers, and observed classes, looking specifically at how often and in what ways computers were being used. Far from transforming early childhood education, Cuban learned, computers were used in ways that preserved the conventional practice of providing care and bonding experiences for young children. Computer use—confined to learning-center options—“sustained the traditional early childhood school model” (p. 67) that focused on social, emotional, and intellectual development.

At the two high schools, Cuban and fellow researchers surveyed and interviewed both teachers and students, and shadowed 12 of the latter, providing the opportunity to observe 35 teachers at work. Cuban discovered that the relatively large total number of computers in the schools notwithstanding, classrooms typically were equipped with a single computer used exclusively by the teacher, though some had several computers upon which students occasionally conducted Internet searches. Overall, according to Cuban, “Integration of computers into classroom curricula and instructional techniques was minimal” (p. 90). Though he did find that the educational experiences of some students were significantly enhanced by access to computer technology, he estimated that they represented no more than 5 percent of the school population. Limited classroom applications of computers did not mean that teachers viewed them as irrelevant to instruction. For a few, computer technology helped them change their pedagogy in the direction of a more student-centered approach. Moreover, 13 of the 21 interviewed reported that their teaching had been positively influenced by their use of technology. These teachers mentioned “planning more efficiently, communicating
with colleagues and parents far more often via e-mail, and securing education materials from the Internet” (p. 94). Similar to the findings of national reports, the teachers interviewed at these schools felt that lack of time and inadequate training were obstacles to integration of computers into classroom practice. In contrast to national reports, however, Cuban concluded that teachers were neither technophobic, nor did age, gender, or experience account for differential use of computer technology.

Cuban’s examination of Stanford University began with a description of the Stanford Center for Research, Development, and Teaching (SCRDT), which was constructed in the 1960s as a state-of-the-art educational facility. Outfitted with an array of audio-visual equipment, it sported, among other things, keypads at each seat called “student responders” that allowed students to provide instant feedback to instructors. After scant use of these special features, the keypads eventually were disconnected and the room became a conventional lecture hall.

The enthusiasm for technology in higher education in the 1960s which brought the (SCRDT) to Stanford surfaced again nationally in the 1980s and 1990s. Renewed interest in technology resulted in expenditures on hardware, software, wiring, and technical support across the American college and university landscape. At Stanford, according to Cuban, “Throughout the 1990s, administrators invested university funds in laying down miles of fiberoptic cables to offices, networking the campus, providing computer clusters in libraries and in residence halls, building elaborate computer labs for professors and their classes, and ensuring that faculty had on-site specialists in departments and schools to assist them in using information technology for both research and teaching” (p. 113). This technologically rich environment, however, did not “revolutionize teaching and learning” as university leaders intended (p. 130). Drawing largely on the surveys of other researchers and his own examination of the use patterns of two high-tech classrooms, his findings were similar to those at the high school level. Faculty actively “use computers to prepare handouts, they use the Internet for information that can be accessed before or after class, and they use e-mail listserves so that students can respond to one another before and after class. However, the percentage of faculty using computers during instruction itself is very low” (pp. 126-127).

Reflecting on what he learned from his research, Cuban notes that his study confirmed his assumption that teachers would use computers to communicate more extensively, to negotiate administrative work more ably, and to prepare for class “with more depth and breadth” (p. 133). Cuban, however, states he did not expect to find that so few teachers would be serious, or even occasional, users of computers in their classrooms and that even fewer would transform the way they teach. Why, he asks, “in the heartland of high-tech innovation, where beliefs in technological progress run strong and equipment is abundant, has there been so little use of the new machines and software inside classrooms and so little change in existing teaching practices?” (p. 130) He proposes three possible explanations
for these findings: the slow revolution, history and contexts, and contextually constrained choice.

The slow-revolution explanation proposes that access to computer technology remains limited and that application has not caught up with technological innovation. Over time, according to this perspective, more extensive access and more sophisticated applications will profoundly reshape teaching and learning. Cuban essentially dismisses this explanation. He maintains that it neither accounts for the disparity between teachers’ significant use of computers at home versus more trivial use at school, nor does it account for the continued employment of traditional teaching methods by those who did use computers in their classes. Further, he states that such an explanation is oblivious to the great increases in expenditures on hardware, software, wiring, support and training during the 1990s.

Cuban turns to “history and contexts” for a more persuasive account of limited computer use in the classroom. This explanation is attentive to “the social and political organization of schooling, societal expectations for schools, and historical legacies, all of which influence what occurs in classrooms” (p. 156). Cuban points out, for instance, that innovative use of computers is limited by high school schedules and departmentalization that stunt faculty interaction—especially across disciplines—and that it is limited as well by the reward system of higher education that values research over teaching. Cuban also notes the pedagogical constraints posed by political and economic forces that pressure schools to conform to a business model emphasizing accountability through incessant testing and invoking investment in technology talismanically rather than programmatically.

Though Cuban believes that economic, political, historical, and institutional contexts explain the lackluster use of computers in schools, he maintains that they do not account for the small numbers of teachers who “used computers to move from largely textbook-bound, teacher-centered practices to more intellectually demanding, complex forms of practice” (p. 166). He consequently turns to contextually constrained choice (situationally constrained choice in previous work) to explain why some teachers use technology creatively in their classrooms despite an array of constraints, noting that teachers, guided by their beliefs and values, have the capacity to exercise considerable autonomy in the classroom. Already innovative teachers may use computers in their classrooms to support their activities, while for teachers who seek to change their pedagogies, computers are one vehicle for bringing more engaged learning into their classrooms.

The implications of the slow-revolution explanation, Cuban points out, lead policy makers in a different direction from the other two. Subscribing to the slow-revolution explanation would imply additional spending to make computers more accessible to classrooms as well as to enhance technical support and professional development. While this approach is consistent with the trajectory of current policy, responding to the history-and-contexts and contextually-constrained choice explanations requires a more complex response. It calls for
altering the social organization of schools to better promote teaching and learning, a project that must be guided by the voices of teachers and the democratic goals of education. Cuban rejects the policy of throwing money at the problem, almost going so far as to “call for a moratorium on buying any more computers for K-12 schools” (p. 192). In opposing a technocratic solution to educational reform, he holds that the uses of technology must be subordinated to a broader view of education in a democratic society than the currently reigning focus on economic productivity, and he maintains that investment in technology must be considered in relationship to the competing reforms such a view might inspire.

Oversold and Underused is a valuable antidote to inflated claims about the capacity of computer technology to transform teaching and learning in the absence of broader changes in the ways schools are organized. It is all the more persuasive because Cuban demonstrates that he is no Luddite. In fact, he highlights the work of teachers whose use of computer technology does appear to make a real difference. Nonetheless, the book suffers from two interrelated shortcomings: it inadequately documents the use of computer technology, and it gives too little weight to the slow-revolution explanation for fulfilling the promise of computer technology.

Cuban’s documentation of computer use is limited by both what he chooses to examine and chooses to neglect. Although Silicon Valley is the national center of innovation in computer technology, it does not necessarily follow, as Cuban implies, that Silicon-Valley schools, with the possible exception of Stanford University, present a best-case scenario for the use of computers. A state-wide history of poor funding and tight bureaucratic controls constrain both the proliferation of computer technology and its imaginative use. In addition, he finds the use of computers too limited at the pre-school level, but it is not clear what he would consider more appropriate. Though used sparingly, computers apparently contribute to the child-centered character of these institutions, the very standard Cuban applies to meaningful computer use. More importantly, Cuban limits his opportunities to assess classroom computer use by excluding elementary and middle schools from his investigation. Whereas high school and college students are largely responsible for their own learning and spend significant time outside of class engaged in learning activities, most learning experiences for elementary and middle school students occur in class and largely involve teacher participation. Thus, it would seem that elementary and middle schools best lend themselves to instructional technology use within classrooms, yet their exclusion precludes an account of the extent to which those in-class learning experiences actually involve computers.

A related problem is that Cuban takes what appears to be an all-or-nothing approach to the use of computer technology. He sets the transformation of instructional practice as the standard for assessing computer use and student-centered activity as the litmus test of that transformation. He consequently offers a
few examples of teachers using technology in classrooms in these exemplary ways, but seems to dismiss anything less. In addition to the classroom use of computers, Cuban acknowledges that teachers rely on them to do administrative work, to prepare classes, and to communicate with staff and parents, but he conveys no sense of the quality or even efficiency of these activities. Does the use of computers reduce teachers’ administrative burden, augment communication with parents, facilitate students’ ability to write multiple drafts of essays, create meaningful research opportunities that transcend the possibilities of local libraries? The point is that computer technology has the capacity to significantly improve teaching and learning without making the classroom student-centered or altering what Cuban and historian David Tyack elsewhere have referred to as the grammar of schooling (Tyack & Cuban, 1995). Cuban, however, does not address the extent to which this capacity is tapped or the way it might be differentially tapped according to the race, ethnicity, and socioeconomic background of students.

By underestimating the extent to which computers are used for instructional purposes in Silicon Valley schools and perhaps also the extent to which they are used to actually enhance teaching and learning, Cuban deflates the explanatory power of the slow revolution. After all, what is the point of investing more in computer technology if teachers do not use what they have very much or very effectively? At the same time, he overstates what teachers do have. Cuban’s characterization of technology as “abundant” in Silicon Valley schools does not square with indications that the technology present in these schools is inadequate for the integrated, student-centered use Cuban expects to find. The most generous availability of technology in the preschools and kindergarten sites (four computers for 30 preschoolers and five computers for 20 kindergarteners) would fall short of meeting most definitions of abundant technology. In addition, indication of the type or condition of the computers in these early education classrooms is limited. The reader is left to wonder how many are multimedia computers, capable of running advanced, interactive software, and how many are Apple IIes, or similar low-capability machines, despite the importance of these differences to the ways they could be used in instruction.

Although the high schools had a number of computer labs, it is more difficult for teachers to integrate technology into the curriculum when computers are housed in centralized locations rather than in classrooms (PCAST, 1997). In the classrooms Cuban studied, computers were often in short supply. He notes, for instance, that in three of the four classes he visited while shadowing a student, there was only one computer used primarily by the teacher. The fourth class had four computers on a cart which also contained a VCR and monitor. Overall, the ratio of students to computers was five to one, close to the national average. Cuban does not report the extent to which students had access to the Internet or used the labs.
Access to technology is a critical factor in the ability to change educational practice. Referring to an older technology, Seymour Papert and Gaston Caperton (1999) suggest it is difficult to imagine that writing could play a prominent role in schools where one pencil per class is the standard allocation, though some imaginative teachers would develop interesting “pencil-assisted-learning” activities. Even an average of a pencil for every five students would not allow for the integration of writing into classrooms that becomes possible when each student has access to her or his own pencil. The problem of scarcity is equally important to newer technology. It is also important to recognize the ever-growing instructional capacity of computer technology, the tendency of its cost to decline dramatically, and more generally as John Seely Brown (2000) has pointed out, the lag-time between the introduction of a new medium and the ability to exploit its unique potential. These factors as well point to the value of increasing the availability of computers and the requisite support services—the slow-revolution perspective Cuban disavows. Cuban’s description of the Teacher Led Technology Challenge (TLTC), in fact, inadvertently supports the slow revolution. Implemented in Berkeley elementary and middle schools, this program aimed to move teachers toward daily, student-centered instructional use of technology by providing them with additional hardware, training, and technical support. Despite Cuban’s use of this program to exemplify “reformers taking teachers’ perspectives seriously, especially in using technologies that build programs around their classroom expertise” (p. 184), the only mention of teacher participation in the implementation of this program is that a volunteer lead teacher in each school provided one element of this training. Cuban does not indicate that teachers provided any input into the structure, operation, or processes of the program. While he notes that a significant number of teachers credit the program with increasing their student-centered practices, nothing apart from an increase in the availability of technology, training, and support accounts for this change in practice. There is no reason to think that the infusion of technology, training, and support provided by this program would not also prove beneficial if implemented on a much broader scale, and the teachers Cuban studied voiced this very desire.

While the constraints of classrooms, schools, and society undoubtedly shape teachers’ use of technology, the continued development of computer capabilities, increasing understanding of what it takes to support and maintain computers in classrooms, and, perhaps most importantly, teachers’ ongoing exploration of classroom application and innovation warrant policy decisions that include provisions for instructional technology. We certainly agree with Cuban that educational innovation must be linked to the democratic purpose of schooling. This does not suggest to us limiting investment in technology, but it does suggest distributing it and its richest applications in ways that support equal educational opportunity.
REFERENCES


CALL FOR BOOK REVIEWS

We are soliciting reviews of contemporary books that promise to have a substantial impact on the field of educational computing. Reviews are intended to inform the readership about the prospective value of the book and as such, should summarize the themes of the work and evaluate the work’s contributions to either theory or practice (or both).

Reviews should be no longer than six double-spaced pages. In special circumstances the Editors will consider a longer essay-review in which the reviewer reflects upon the meaning of the work within a larger theoretical perspective. Before undertaking to write a review, please contact the Review Editor.

DR. MICHAEL F. YOUNG
Program in Educational Technology
University of Connecticut
U-4, 249 Glenbrook Rd.
Storrs, CT 06269-2004
(860) 486-0182
FAX: 860-486-0195
e-mail: myoung@UConn.Edu