

The dubious promise of educational technologies: Historical patterns and future challenges

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ldm.sagepub.com**Larry Cuban**

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Abstract

In this article, Larry Cuban discusses his ideas about the topic of this Special Issue of E-learning and Digital Media 'Networked Realms and Hoped-For Futures: A trans-generational dialogue' with one of its co-editors, Petar Jandrić. The conversation explores the historical relationships between education and information and communication technologies and draws lessons for present and future. The first part of the conversation explores methodological issues pertaining to historical thinking about schools and computers in the network society. It identifies a continued need to recognize historical patterns, including those in thought experiments, and shows that Rogers' theory of diffusion of innovations should be supplemented by more nuanced approaches to the historical relationships between schools and computers. The second part of the conversation presents an attempt to explain historical patterns using the ancient notion of magical thinking. It explores why teachers use computers in their private lives much more than in their professional lives, and 'school anarchy' caused by student usage of personally owned devices in classrooms. It creates a baseline for comparison between desktop / laptop computers and various hand-held devices, and dismantles the quest for deschooling as another example of magical thinking. The third part of the conversation examines the ideological role of information and communication technologies in contemporary school reform and explores their potential for democracy. It analyses the contemporary transformations of traditional publishing formats such as books, journals and newspapers, and their reflections in the world of academia. It examines the changing role of teachers as public intellectuals, and the role of information and communication technologies in their public exposure. The last part of the conversation analyses the process of 'educationalizing' various social and economic problems, and links it to contemporary technologies. It revisits Larry Cuban's predictions from *Teachers and Machines: Classroom Use of Technology Since 1920* (1986), and reminds us that accurate predictions are rare, while inaccurate ones are not only common but often memorable. Finally, it examines why it is so hard to balance education with information and communication technologies.

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Introduction

Petar Jandrić (PJ): Larry, it is a great pleasure to have this opportunity for conversation! In this Special Issue, we invite authors to step back from the never-ending quest for new concepts and ideas and to revisit past insights into the relationships between education and technologies. You have a truly fascinating research background in the history of education and the use of technology in the classroom, and more than half a century of experience in various roles within the US educational system. Therefore, I would like to begin this conversation by asking you to place our editorial efforts into the wider context of educational research. Decades ago, in the article entitled 'Four Stories: About National Goals for American Education', you wrote:

Historians invent the past. I do not mean that historians invent facts, although they frequently discover new ones; I mean that historians ask questions of the past, analyse the available sources and evidence, and filter the data through their experiences, values, and expertise to create their own versions of what happened. Because historians are products of their times and differ one from the other, histories of the same event, era, or institution will vary. As vividly demonstrated in the classic film *Rashomon*, in which the story of an attack on medieval nobles is told from different points of view, history is woven out of multiple interpretations of what happened. (Cuban, 1990: 265)

Together with many other readers, I tremendously enjoy your inventions of the past outlined in books such as *Teachers and Machines: Classroom Use of Technology Since 1920* (Cuban, 1986). However, speaking of things that happened 60 or 70 years ago is obviously very different from speaking of technological developments that happened last summer. In school use of technologies such as radio, film, television and even early personal computers, it is easy to distinguish between different generations of technologies. However, contemporary computer power combined with high-speed Internet has been widely available for less than two decades, and various hand-held networking devices are even younger. On the very day of purchase, my smartphone is already outdated – and its producer does not even try to hide the intention to make it fully obsolete in a few short years. Rapid development of information and communication technologies makes their past and present increasingly intertwined. Therefore, I would like to start this conversation by asking what happens to traditional historical thinking in the age of the network? Can we still apply traditional historical approaches to the questions concerning education and technologies? Using the metaphor from another of your early articles (Cuban, 1995), should we conduct our research like hedgehogs or like foxes?

Larry Cuban (LC): I cannot recommend either the fox or hedgehog approach to research. Both seem to be essential but I do know for sure that I am a hedgehog. By that I mean I have persisted in investigating how teachers have taught during high visibility reform periods in the past and how policy, then and now, gets translated into classroom practice. Technological innovations, of course, mandated by policymakers or eagerly embraced by educators (or both) fit into my unrelenting focus on teachers and teaching, past and present. So I have looked at past efforts school reformers have made to introduce technological innovations and found

patterns – see *Teachers and Machines* (1986). Those cyclical patterns have accompanied new technologies for nearly a century: reform-minded policymakers surround the innovation with extravagant claims followed by academic studies showing limited or unimaginative classroom use of devices followed by disappointment and then blame heaped upon teachers rather than those who made the initial claims. Two current versions of that cycle I see unfolding right now with the spread in the US of tablets and 1:1 tablets and laptops. The cycle also appears in Massive Open Online Courses (MOOCs) in higher education.

Knowing historically that these cycles have been present for over a century and how earlier generations of well-intentioned reformers faced similar situations as do current cheerleaders for tablets and MOOCs could help contemporary decision-makers design policies and implementation campaigns that incorporate teachers early in the process of buying and deploying the newest high-tech device and software. In my judgement, then, describing and analysing the past, particularly the nexus between new technologies and schooling, is needed even more to inform policymakers, practitioners, and researchers.

PJ: Several contributions to our Special Issue are inspired by science fiction. In a way, science fiction allows us to ‘experiment’ with alternative realities, and even with parallel histories, without real-life consequences. Famous works of science fiction such as Isaac Asimov’s opus dedicated to robotics, Stanley Kubrick’s *2001: A Space Odyssey*, William Gibson’s *Neuromancer* and the Wachowski brothers’ *Matrix* (just to mention a few) have been ongoing sources of inspiration for (computer) scientists. What do you think of attempts to inspire educational research by science fiction? Could we interpret those imagined and/or hoped for futures as genuine thought experiments, or should they be taken much more lightly?

LC: Futuristic scenarios of schooling predicting (or wishing for) what schooling will be like a half century or a full century from now have been around for decades. (Either inspired by science fiction or created out of one’s imagination, ones now put forth read like science fiction to me – nearly all instruction for children and youth online and the disappearance of bricks and mortar schools with all schooling occurring in the home, workplace, and other settings.) A number of advocates for online learning in K-12 schools see the eventual replacement of formal schools by children and youth working at home and non-school sites including the workplace. Historically, I have seen so many of these fictional leaps into the future with a nearly inevitable lack of substantial movement toward such scenarios. So I remain highly sceptical of these scenarios. Nor do I take them seriously as thought experiments. I do take them seriously as hoped for futures. When such fictitious leaps do appear, they tell me more about the values and aspirations of the author(s) than predicting what will occur.

PJ: Your works often refer to concepts from Everett Rogers’ theory of diffusion of innovations (Jandrić, 2012; Rogers, 1986, 1995) such as ‘early adopters’, ‘late adopters’ and ‘laggards’ (i.e. Cuban, 2003: 105). Up to fairly recently, it made a lot of sense to apply Rogers’ theory to the relationships between computers and education: year by year, one could literally see incremental increase in adoption of information and communication technologies in Western schools. Nowadays, however, when most citizens of the developed world are constantly connected, counting computers or users of certain software might seem a bit outdated. What is the relevance of Rogers’ theory of diffusion of innovations for the contemporary relationship between education and information and communication technologies? Could Rogers’ theory be antiquated? Could it, perhaps, be complemented by more nuanced approaches? Where should we look for those new approaches?

LC: You raise a nice point here. I have used Rogers’ diffusion theory because it did fit the first three decades of the introduction of high-tech devices into schools. There are two

reasons, however, that other theories should be tried out to explain the spread of both devices and software, of teacher use in classrooms, because, as you point out, devices and software are becoming ubiquitous in the developed world. First, Rogers' diffusion theory has certain biases built into it. For example, the theory favours those who adopt new technology over those who do not or are slow in embracing the innovation, i.e. 'laggards'. The theory ignores the simple truth that in some situations with some innovations, teachers and other educators may have ample justification to say no to a new policy, a new device or software. Saying 'no', however, is viewed as a negative within the theory. The second reason is that blame haunts the theory. For those who are slow to adopt or chose not to adopt, or when innovations suffocate for lack of resources, users such as teachers, more often than not, get blamed. That, too, is built into the theory.

For those reasons, other ways of looking at how innovations spread should become part of the researcher's repertoire. For example, theories that look more closely at the features of the innovation and the context in which the innovation is placed make a great deal of sense to me. The interaction between innovation characteristics and the conditions present in particular settings needs to be investigated without blaming who does the implementation or how it unfolds in particular settings. Also consider *Hype Cycle* developed by private sector consulting firm Gartner as another way of defusing bias and blame inherent in diffusion theory. The *Hype Cycle* tracks the historical path that technological innovations have followed. According to people's expectations, it divides that path into the following five phases: technology trigger, peak of inflated expectations, trough of disillusionment, slope of enlightenment and plateau of productivity (Gartner, 2014). In this way, the *Hype Cycle* offers another way to examine the context interacting with the innovation free of blame, but even this construct contains biases that need to be made explicit.

Magical genie from the computer

PJ: In a recent blog post, you quote Mike Trucano's 'one of the 9 worst ed tech practices in the developing world: *Dump hardware in schools, hope for magic to happen*' (Cuban, 2014a), and expand it into a very interesting historical analysis. What is magical thinking in the context of schooling and computers? Where does it come from; will it ever end?

LC: Magical thinking is a belief in scientifically unproven causal relationships between human actions and events. It may well be hard wired into our brains: after all, one can see it in action during illnesses we have, disappointment in careers, or even in troubled families. And it occurs in organizations undergoing stresses in dealing with serious problems. Thus, during times when schools have been heavily criticized for failing (which has been the case in the US since the mid-1950s), electronic technologies – Skinner's 'teaching machine' was popular in the 1950s – have been drafted time and again to alter teaching and get students to learn more, faster and better. So magical thinking, in my opinion, seems to be connected to times when each of us, including school reformers, wish for a better, happier time. In a society enamoured with new technologies, it would seem to occur often.

PJ: *Oversold and Underused* (Cuban, 2001) clearly shows that teachers use computers in their private lives much more than in their professional lives. Much of the reference to school usage of technology, however, is about its imposition, as it were, by authorities and interested groups. Is there any correlation between these facts? What about personal ownership of powerful technologies by the students and teachers themselves and what about their status as experienced (by some definitions) users of social media?

LC: Yes, there is a correlation between mandated or imposed uses of new technologies and implementation problems showing up in classrooms, particularly if teachers' legitimate concerns and needs are ignored in the policy discussions about improved teaching and learning. That has happened often in past deployments of new technologies in the US. From the experiences of one-laptop-per-child in other countries, it may be the case as well.

The gap in use of computers between school and home for teachers may be related to the above point and also linked to the lack of relevant software, on-site technical assistance, and lack of first-hand evidence that students will achieve more academically with electronic devices. The discrepancy in use between home and school has little to do with the teacher's experience with devices or social media and far more to do with the historic role of teacher as gatekeeper to the classroom, a role that policymakers have generally overlooked or ignored for decades.

PJ: What about the anarchy brought about by the students having their own devices, and the frequent response to this of banning the use of such personal devices in the classroom or school?

LC: There have been examples of schools urging students to bring their own devices and having teachers work with a myriad of mobile devices. While some of these experiments may linger for a while, in an age where standardization in policy, procedure and equipment is the clear direction that the US and other nations have taken, such instances of bring-your-own-device will become footnotes to any history of technology use in schools.

PJ: Your research clearly shows that large classroom desktop or laptop computers are *Oversold and Underused*, and predicts that with these technologies 'no fundamental change in teaching practices will occur' (Cuban, 2001: 196). During the past decade, however, computers have evolved into various hand-held devices that have become our constant companions. The desktop computer links us to the Internet, but the smartphone transforms us into truly networked, cyborg-like organisms which strongly resemble androids from James Cameron's film *Terminator*. In *Alone Together*, Sherry Turkle calls that phenomenon 'the new state of the self' (2012: 157), and identifies the 'life mix' as 'the mash-up of what you have on- and offline' (Turkle, 2012: 160). Inspired by your recent blog post about the effects of high-tech on people (Cuban, 2014b), could you try and create a baseline for comparison between those generations of technology? Do you think that this 'new state of the self' has the potential to challenge the ways that information and communication technologies are currently being used in education?

LC: Yes, I do. The potential is there. Futuristic scenarios of virtual schools and the gradual elimination of bricks-and-mortar schools capture the potential that champions of accelerated online instruction push. Realizing those scenarios, however, will continue to disappoint advocates of establishing more virtual schools. Why?

Advocates for virtual schooling largely ignore a historical fact. The larger political, social and economic role that public schools have performed (and continue to do so) has to be taken seriously since multiple goals for tax-supported public schools have been a reality for two centuries in US schools and I suspect for most other nations with publicly financed educational systems. Moreover, any gap between major changes in society, the economy and cultures, and what schools are doing has been translated time and again into school reforms to eliminate those gaps. In the US and most of Europe, tighter links between the economy and schools over the past quarter century, for example, have been forged in the belief that tougher standards, tests and accountability will improve schools and strengthen the economy by producing multi-skilled graduates entering the labour force.

Or consider another example. The swift access and use of mobile devices in the US and developed world have not yet been matched by changes in how schools are organized, how teaching usually occurs and gains in student achievement – expectations raised by the new technologies applied to schools. A large gap continues to exist between the daily whirl of information and communication devices outside the school and what teachers do with students inside their classrooms. In the US, a buying binge has occurred to stock classrooms with devices and new software to reduce the gap.

But organizations, I have learned from both research and experience, have plans for those who seek to change routine policies and procedures inside those organizations, especially for a community institution with many aims (e.g., civic engagement, socializing the young into community values, reducing inequalities) that transcend acquiring information and swift communication. Most institutions such as schools, hospitals, the criminal justice system and the military try to maintain their stability amid constant calls for changing what they do. As organizations, these institutions have learned to incorporate changes into ongoing routines. Thus, stability and change exist in most of these institutions in uneasy tension. Academics call this tension: ‘dynamic conservatism’ (Schön, 1971: 39). I see that dynamic conservatism at work in schools as they learn to accommodate to frequent and urgent calls for change in policies and daily practices. Too many cheerleaders for high-tech believe that hardware devices and software applications will revolutionize schooling practices. They, sadly, ignore or forget these lessons learned by earlier generations of reformers.

PJ: You have spent more than half a century within schools. However, information and communication technologies have opened up vast spaces for less formal teaching and learning. During the 1970s, a small band of researchers such as Everett Reimer (*School is Dead*, 1971), Paul Goodman (*Compulsory Miseducation*, 1973) and Ivan Illich (*Deschooling Society*, 1971) called for complete abandonment of the traditional concept of schooling through information and communication technologies. In order to replace traditional schools, Illich proposed creating large-scale, non-institutional educational infrastructure which consisted of a set of four interlocking educational networks: reference services to educational objects, skill exchanges, peer-matching and reference services to educators-at-large (Illich, 1971). After more than four decades, this vision is embodied in various initiatives such as the Khan Academy (2014), and it is easy to agree with Hart’s conclusion that ‘it is not too far-fetched to assert that Illich predicted the World Wide Web’ (2001: 72). What do you think of the contemporary potential for deschooling?

LC: Deschooling in 2014 comes wrapped in the mantle of total online or virtual schooling, home schooling and similar schemes that dispense with brick-and-mortar schools. Sure, access to the Internet and fire hydrant gushers of information does appeal to many champions of more high-tech in schools – some of those champions, however, might wince at what Ivan Illich, Paul Goodman and Everett Reimer wrote in the full flush of school-haters in the 1960s and 1970s. What so many deschooling advocates overlooked then (and now) in their zeal to dismantle public schools, both good and bad ones, are the multiple functions that public schools serve in a democratic society. Most of the deschooling advocates were opposed to US schooling on ideological, not effectiveness, grounds. Schools taught conformity, squelched real learning, overlooked individual differences among children and youth, and were holding tanks for eventual dropouts.

Today, eager promoters of high-tech in schools are less concerned about political and social ideology as that earlier generation was. Much of their eagerness for virtual schools is driven by the failure of public schools to be efficient and effective in producing graduates

who can enter the labour market and be productive workers – a different ideology, to be sure. Where producing graduates for the economy the primary goal of tax-supported public schools in the US, perhaps deschooling might have some traction. But that is not the case. Schools have custodial and socialization functions (e.g., becoming productive citizens, abiding by community norms, thinking critically, etc.) that are crucial to a democratic society. Deschooling advocates of the 1970s wanted to dispense with those functions completely. High-tech champions of online schooling and blended schools, too often ignore these functions in their lust for more, better, and faster information and communication in schools.

PJ: Could we say, then, that the idea of deschooling is just another example of magical thinking?

LC: Yes, it is a prime example of that wishful thinking.

Public intellectuals in the age of the network

PJ: In the first half of *Tinkering toward Utopia: A Century of Public School Reform*, you and David Tyack have analysed educational progress as ideology (1995). Following the main focus of our special issue – the invitation ‘to step back from the never-ending quest for new concepts and ideas and to revisit past insights into the relationships between education and technologies’ (Jandrić, Sinclair and Macleod, 2014) – it would be interesting to expand your analysis of ideology to information and communication technologies. In *Technology and Science as Ideology*, Jürgen Habermas claims that

The progressive ‘rationalisation’ of society is linked to institutionalization of scientific and technological development. To the extent that technology and science permeate social institutions and thus transform them, old legitimations are destroyed. The secularisation and ‘disenchantment’ of action-orienting worldviews, of cultural tradition as a whole, is the obverse of the growing ‘rationality’ of social action. (Habermas, 1970 (1968): 81)

This claim is clearly reflected in many aspects of your work. Nowadays, for instance, rationalization is often interpreted through introduction of business methods into schools and your book *The Blackboard and the Bottom Line: Why Schools Can't be Businesses* (Cuban, 2005) provides prime arguments against destruction of old legitimations. However, Habermas’ thinking is deeply embedded in the spirit of the industrial society powered by traditional mass media such as radio and television. Therefore, could you please reflect on the ideological role of information and communication technologies in contemporary school reform?

LC: The ideology of progress embedded historically in school reform that David Tyack and I analyse in *Tinkering Toward Utopia* (1995) is still alive and well in 2014. It is called ICT (information and communications technology), online instruction and virtual schooling. Flush with hype, reformers promoted electronic technologies in the 1920s as ways of getting students to learn more, faster and better than they had, and for teachers to alter traditional ways of teaching. That continues today globally. While deep divisions among US school reformers exist, currently top political and business leaders see ICT, along with expanded parental choice of schools, national curriculum standards, testing and accountability for results, as the eight-cylinder engine for transforming schools into more efficient, effective institutions producing graduates who can enter the labour force and contribute to a growing economy. For example, the surge of interest in online instruction in elementary and secondary public schools and the spread of virtual schools is one feature of the contemporary

reform agenda mirroring this ideology of inevitable progress toward a more rational economy, efficiently operated institutions and effective school performance.

PJ: During the past decade or so, there has been a lot of talk about the potential of information and communication technologies for democracy (Jandrić and Boras, 2012). In several books, including but not limited to *Why Is It So Hard to Get Good Schools?* (Cuban, 2003), *Hugging the Middle – How Teachers Teach in an Era of Testing and Accountability* (Cuban, 2008) and *Tinkering Toward Utopia: A Century of Public School Reform* (Tyack and Cuban, 1995), you analysed the social role of education in a market-driven democracy. How do you link traditional relationships between education and democracy with information and communication technologies?

LC: The short answer is ICT entered schools largely for economic and social reasons. Yes, there was also a political rationale such as increased civic participation in and out of schools, but it was clearly subordinate to the other reasons. The long answer is as follows.

Beginning in the early 1980s with the introduction of the personal computer, reformers touted not only the use of computers in schools as the remedy for a declining economy and failing schools, but also a way of expanding child and youth participation in community affairs, building civic engagement and revitalizing the democratic spirit in the US. Keep in mind that using the word ‘democracy’ can mean different things to different people: an individualistic-driven version, a communitarian one and a deliberative form. Such definitions matter and need to be made explicit. They went undefined in these years. Since those heady times, when scenarios of high-tech citizen participation became standard fare for those championing new technologies outside of schools, the belief that using computers and hand-held devices will strengthen policy deliberations and democratic practices in schools and at all levels of government (however defined) still remains a strong vision for ICT enthusiasts.

The appeal of the Internet encouraging virtual communities and democratic participation has attracted academic researchers, political leaders, and educators. Lincoln Dahlberg (2001) and Benjamin Barber (1998) argue that these new technologies can nurture different forms of democracy but as far as I can see, beyond outlier examples, such arguments have yet to persuade educators to use ICT regularly in schools and classrooms to encourage more democratic practices in classroom lessons. Perhaps part of the reason for this is that in the past thirty-odd years, policy elites have stressed an economic rationale for schooling (i.e. prepare the next generations with job-anchored skills for an ever-changing workplace) thus superseding a political rationale, i.e. civic engagement. Thus, I have yet to see that the growth of new technologies, their ubiquity and use in schools have led to increased student participation either in schools or as high school graduates engaged in their communities, or even increased rates of voting over the past three decades.

PJ: You are a prolific writer of academic books and articles, and a very active blogger. Since 2009, your website, *Larry Cuban on School Reform and Classroom Practice* (2014c), has been accessed nearly 800,000 times by readers scattered all around the world (nearly 40% are international viewers). More often than not, your texts have provoked vivid online discussions containing 30, 40 or even 50 responses. This level of public engagement demands a lot of your time and effort. In the current academic setting, however, it is definitely considered less ‘important’ than standard forms of academic writing. As Emeritus Professor, you do not have to worry about the status of your writings. However, the rest of us mortals must carefully choose our battles in order to survive in the academic markets. If you agree, I would like to ‘attack’ this problem on two separate levels. First, what is the future of

traditional publishing formats (such as books, journals and newspapers) in the context of information and communication technologies? Second, how does it reflect to the world of the school/academia?

LC: For someone who has only a 50% average in predictions – see forecasts that I made in *Teachers and Machines* (Cuban, 1986) – I have a mediocre record in looking around the corner to see the future interaction between ICT, academic advancement and traditional publishing formats, that is books, journals, etc. Consider that in the US there has been a steady drop in tenure-line positions in colleges and universities with a corresponding increase in short-term adjunct, non-tenure positions. For those academics in tenure-line posts seeking promotion, more and more peer-reviewed journals will be online and peer-reviewed e-books and similar electronic versions will spread. So I believe that getting published in traditional venues will continue to be the gold standard. In these tenure-line academic positions, I doubt very much whether being a blogger will help one get promoted, however. In the US, I do not know of any concerted effort in universities to include blogs as part of the portfolio submitted for a tenure decision. Depending on the academic discipline, being first author on a team-produced article or writing a book will continue, in the short term, to be highly prized within colleges and universities. Once tenure is gained, however, for those academics who aspire to reach larger audiences (e.g. teachers, administrators, policymakers and parents) for their ideas and research, then blogging is clearly one venue that goes beyond those few thousand who read academic journals.

I see writing for larger audiences as a form of teaching, not for academic advancement or influencing the discipline. Newspaper articles, blogging and writing for general audiences in large-circulation online and print magazines is a way of getting ideas into the school reform marketplace, offering different perspectives that readers may not have encountered elsewhere.

PJ: Just a wild thought, Larry: have you ever considered turning your blog into a book? I'm sure that it would be fairly easy to cherry-pick the most interesting articles, together with some exciting discussions, and make a great and easy-to-read collection. Perhaps that would be a good way to integrate the technological and the traditional, the popular and the academic...

LC: I have had that thought, Petar, but for now have dismissed it. I am currently working on a new project about the teaching of history in US schools a half-century ago and now.

PJ: Sounds like a really interesting project, Larry – I can't wait to read about it! History is one of the subject areas which clearly show that teaching is much more than a job, and our duties reach far beyond achieving 'benchmarks' of standardized curricula and testing. Whenever we enter our classrooms, our thoughts, opinions and attitudes become public – in this sense, all teachers are public intellectuals. Up to a few decades ago, traditional mass media such as newspapers and books have allowed only so much space to publish our thoughts outside classrooms – and entrance to this space has been carefully guarded by a whole structure of editors, reviewers and other gate-keepers. Nowadays, however, information and communication technologies are supporting wide spaces for public engagement without middlemen. Anyone can start a blog, and its success depends only on the author – having skipped middlemen, we fall into a rabbit hole where millions of websites float and struggle for recognition. What are the main challenges pertaining to teachers' public engagement in the age of the network?

LC: I have been very impressed by the last decade's explosion of teacher and principal blogs, including ones from retired teachers and other practitioners. Many of my blog viewers

are teachers and school-site administrators – where they find the time to read and write I do not know – and I learn a great deal from those who I read. I consider this flowering of teacher and administrator writing a decided plus for the profession and public debate over policy.

Historical patterns and future challenges

PJ: Your prologue to *Tinkering Toward Utopia* makes a very convincing historical argument that ‘reforming the public schools has long been a favourite way of improving not just education but society’ (Tyack and Cuban, 1995: 1). In your talk in Barcelona (Cuban, 2010), you named this process ‘educationalizing’ of various social and economic problems. Similarly, information and communication technologies also seem to be perceived as a panacea for almost everything. Our factories are losing from competition? Let’s buy new computers. Our office productivity fails? Let’s buy new computers. Our students fail at standardized tests? Let’s buy new computers. For the purpose of this argument, I will name this process ‘technologizing’ of contemporary social problems and cautiously add that a Google search for this term returns only four sources. How would you analyse the relationships between ‘educationalizing’ and ‘technologizing’ of our society?

LC: David Labaree has used the term ‘educationalizing’ to refer to the US policy elites’ habit of using school reform to solve US social, economic and political problems (see Labaree, 2008). What ‘educationalizing’ means is transferring societal structural problems to the institution of schooling so individual students and teachers then become first, an easy target to blame, and second, responsible for solving the problem. For example, national health problems of smoking tobacco and drinking alcohol in the prior century got translated into school courses for youth about the physical and cognitive damages done by both drugs. Too many road accidents? Driver training and completing a safe driver’s course for high school graduation became a school-based solution to a national problem. And as you pointed out in your question, the harnessing of schools to an increasingly high-tech economy means that children and youth are engaged early and persistently in using electronic devices so that they can easily fit into a high-tech workplace. What you call ‘technologizing’ to me becomes just another instance of policy elites ‘educationalizing’ a national economic problem into school reforms focusing on teacher and student use of devices, implying that such access and use of devices in schools across the country will somehow improve national economic growth and productivity.

PJ: Three decades ago, you published *Teachers and Machines: Classroom Use of Technology Since 1920*. Only four years after the famous appearance of the computer on the cover of *Time* magazine in 1982, you dedicated a whole quarter of the book to ‘the promise of the computer’ (Cuban, 1986: 72–103). Some of the presented conclusions are just as relevant today. For instance, it cannot be disputed that ‘to question computer use in schools is to ask what schools are for, why teachers teach certain content, how they should teach, and how children learn’ (Cuban, 1986: 98). At the time, however, it was impossible to predict the depth and extent of social change brought by information and communication technologies.

Standing on the shoulders of previous research efforts, we can learn from fulfilled predictions just as much as we can learn from failed promises. Based on the most successful predictions and the deepest historic failures, therefore, what can be learned from the first one hundred years of marriage between education and technologies? If you set out to rewrite *Teachers and Machines*, what would you do differently?

LC: Thanks, Petar, for recalling that quote from *Teachers and Machines*. It is the one I have used often. Please allow me to reproduce the blog post I wrote about this topic five years ago: A quarter-century ago, I described and analysed the history of machines deployed in classrooms (film, radio, instructional television and the newly arrived desktop computer) to help teachers teach more, faster and better. Then I did something foolish in the final chapter. I predicted future uses of computers in classrooms from my vantage point in 1986.

Of course, I was not alone in making predictions. Seymour Papert dove into the same empty pool that I did a couple of years before my venture into crystal ball gazing: ‘There won’t be schools in the future . . . I think the computer will blow up the school. That is, the school defined as something where there are classes, teachers running exams, people structured in groups by age, following a curriculum –all of that’ (Papert, 1984). Based upon my research in schools and experience as a teacher and superintendent, however, I was far more sceptical about the penetration and use of computers than Papert. Here is what I predicted in *Teachers and Machines* for computers in schools:

I predict that . . . in elementary schools where favourable conditions exist, teacher use will increase but seldom exceed more than 10 percent of weekly instructional time [roughly 3 hours a week]. Pulling out students for a 30-to-45-minute period in a computer lab will, I suspect, gain increasing popularity in these schools . . . In secondary schools, the dominant pattern of use will be to schedule students into [labs] and one or more elective classes where a score of desk-top computers sit . . . In no event would I expect general student use of computers in secondary schools to exceed 5 percent of the weekly time set aside for instruction. I predict no great breakthrough in teacher use patterns at either level of schooling. (Cuban, 1986: 99)

As events unfolded in the next quarter-century, my prediction flat-lined. Access to computers – desktops, laptops, hand-held devices and interactive white boards – soared. In writing *Oversold and Underused: Computers in Classrooms* (Cuban, 2001), I did find higher percentages of students and teachers using computers in preschools, secondary schools and universities that ruined my 1986 prediction. Since then, hundreds of thousands of students and tens of thousands of teachers across the country have received 1:1 laptops, tablets and white boards. In researching classrooms since 2001, again, I have found higher use by teachers and students in both elementary and secondary classrooms. More teachers – my guess is over 30% across different districts – use machines for instruction (I include the whole panoply of available high-tech devices) regularly, that is, at least once or more a week. Another 30 to 40% use computers occasionally, that is, at least once or more a month. The remainder of teachers – still a significant minority – hardly ever, if at all, use machines for instruction. This continues to puzzle researchers and policymakers since they know that nearly all teachers have high-tech devices at home. So my 1986 prediction on teacher and student use of computers for classroom instruction was inaccurate and died a quiet death. Compassionate readers seldom remind me that I flopped in peeking into the future. The facts are clear that students and teachers use high-tech devices for instruction more than I had foreseen.

One final confession. I stated clearly in *Teachers and Machines* and subsequent writings that the uses of new technologies for classroom instruction would seldom satisfy those advocates of more instructional use in schools, because teacher use would tend toward the traditional, blending both teacher- and student-centred approaches, and such approaches were seen as unimaginative. Not all teachers, by any means, but enough for the charge of uncreative teacher use to be commonly pointed out. Both of these predictions have turned out to be accurate . . . so far is a large block quote of Cuban (2010a).

I confess to my errors in foreseeing the future for no other reason than to remind readers, both champions and sceptics of computers in schools, that accurate predictions are rare and inaccurate ones are not only common but often memorable. So if I re-wrote *Teachers and Machines* (Cuban, 1986) today, what predictions would I make? I would predict that well over 90% of US schools a quarter-century from now will be age-graded and brick-and-mortar, not virtual ones. There will be much more blending of online and face-to-face instruction in classrooms as students get older – more of the latter in elementary schools and more of the former in secondary ones. Most teachers – at least 75% – will use some form of device regularly in parts of daily lessons because they have expanded their repertoire of teaching activities to achieve their goals for student learning. Those uses by teachers and students will be far more integrated into daily lessons, yet will still be criticized by that future generation of techno-enthusiasts as obsolete and unimaginative,

PJ: At the very end of this exciting conversation, Larry, I would like to paraphrase one of my favourite titles (Cuban, 2003) on the long shelf of your books and ask a simple yet very important question: why is it so hard to balance education with information and communication technologies?

LC: The question assumes that ICT is a separate force apart from formal age-graded schooling. In one sense ICT has been separate because policy elites (business, civic and political leaders) as well as vendors have lobbied local, state and federal decision-makers to introduce computer devices into classrooms and schools. These lobbyists for ICT have argued unrelentingly for the past three decades that ICT will modernize schools, strengthen the economy, alter traditional teaching methods, and increase the academic performance of US students. And they have become increasingly successful as lobbyists for ICT. If anything, current spending on ICT has increased greatly in the last decade, suggesting an imbalance.

The reasons for the increased access to ICT are straightforward: the historic pattern of a decentralized system of US schooling – that is, nearly all 14,000 school boards are elected and fund their schools out of local monies. These local school boards have multiple goals to achieve in spending these monies and allocating staff, such as insuring that graduates are literate, can go to college or enter careers when they graduate, have embraced community values, get engaged in their communities and are independent thinkers. Such multiple goals and structures of local policymaking and funding guarantee conflicts among groups over how school dollars should be spent and the larger issue of civic leaders deciding how much money should schools get as compared to police, fire and other local agencies. The larger questions about what schools should teach, how teachers should teach and toward what ends schools should be aimed, may or may not be raised publicly, but answers to those questions vary among voters and policy elites.

All of this decentralization in a rowdy democracy makes tax-supported schools politically vulnerable to shifts in school goals and practices. With the centralization of state and federal authority over schools since the mid-1960s, local lobbying still occurs, but the pattern of top-down mandates from state and federal authorities (e.g. *No Child Left Behind* and *Common Core Standards*) occurs far more often and reveals again how politically vulnerable local public schools are. After all, what I call ‘political vulnerability’ non-educators and influential policymakers call ‘democratic participation’ by community leaders and their coalitions. And this is why ICT feels separate from education when, in actuality, it is part and parcel of what policy elites and voters believe teachers do daily in getting students to learn, with or without electronic devices.

The short answer to your question, Petar, is that for tax-supported schools, democratic politics mean that those who want teachers and students to have more and better access and use of ICT in classrooms compete with other interest groups that seek an upgraded science curriculum, less (or more) standardized testing, more (or fewer) charter schools, and judging teacher effectiveness on the basis of student test scores. That is why ‘it is so hard to balance education with information and communication technologies’.

PJ: Thank you a lot for this exciting conversation, Larry!

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