There is no technological solution to the problems of education in America. It is a billion-dollar American delusion that the application of new technologies will make a significant difference, in the long run, to what happens in the classroom. All instructional technologies are only a means to an end.
culture (not just an economy), their children are not difficult to teach and will learn what they need to learn from available technologies.

It is worth saying amidst the sound and fury about new instructional technologies that pen, paper and book are instructional technologies and quite adequate for all our needs. They are relatively inexpensive, user-friendly, and have passed the test of time, which is to say, they work. There is no respectable subject that cannot be taught using pen, paper and book. It may be nice to have movies, TV and computers but they are not necessary to provide children with a sound education. In fact, just about all the men and women who invented the technologies that make teachers tremble with innovative desire were educated exclusively with pen, paper and book. But pen, paper and book are no panaceas. Like all instructional technologies—new and old—they are impotent machines unless we have some meaningful story to tell our children. It may be a story about their souls, or their minds, or their history, or their country, or even their planet. But it must be strong and romantic and inspiring. It must be capable of touching the heart and nerves, and it must explain who they are and why they are here and what is expected of them. And, of course, we who tell it must believe it. If we believe it, the children will believe it. If the children believe it, our problem is solved, and computers won’t have a damn thing to do with it.  

LEWIS J. PERELMAN

The role of modern technology in education is precisely the same as the role of the automobile in the horse economy: replacement. In the knowledge-age economy that will endure from now right through the 21st century, learning is in and school is out.

More education is not the cure to our economic doldrums. Rather, it’s one of the major causes of the malaise. Education has become a lethal saviour. Like a solid-gold life jacket, it glitters for attention, it’s outrageously expensive, and the longer we cling to it the deeper it will sink us.

The reason is that schooling—as a technology, as an economic sector, as a way of life—has become terminally unengaged from the real world of working and living. A growing new wave of technology is totally transforming the social role of learning:

• Learning used to be something done only by humans. Now learning is a process humans share with artificial brains and networks that ‘learn’ to adapt their functions to human needs and deliver instruction to people where and when they need it most.

• Learning was thought to be confined to the box of the classroom. Now learning permeates work, entertainment and home life. Some 99% of what the average American now learns in a lifetime is learned outside any classroom.

• Learning was believed to be the result of a linear ‘teaching’ process in which knowledge would flow like wine from the copious fountain of the ‘expert’ professor into the empty head of the obedient and grateful student. But with the volume of information explosively doubling every year or so, personal expertise may last only a few days and is available to anyone who has the telecomputing tools to plug into the right networks.

• Learning meant schooling and schooling was kid’s stuff, to be ‘graduated’ from so that youth could ‘commence’ adult life. But learning is now what ‘knowledge workers’—already from two-thirds to three-quarters of the U.S. work force—get paid to do, and it is what virtually all adults will do for a living by the beginning of the 21st century.

I call the new wave of technology that is not only replacing education but transforming the whole modern economy hyperlearning or just HL.

Henry Ford’s Model T was not an invention so much as the integration of a set of technical advances in power plants, rubber tires, batteries and other components as well as fuel-refining, production-engineering, employment policies and marketing strategies—a total system that changed not just transportation but the entire fabric of Western society. Similarly, HL represents the imminent integration of skyrocketing advances in the so-called ‘artificial intelligence’ of computers and robotics, broad band ‘multimedia’ communications, ‘hyper’ software needed to cope with the resulting information explosion, and even ‘brain technology’ that is expanding our understanding of how human and artificial brains work.

The atomic bomb, said Einstein, changed everything but our thinking. HL will change everything and our thinking.

To get a feel for the coming economy of hyperlearning, skip the computer-garnished ‘Classroom of Tomorrow’ (which has as much to do with the real future as Disney World) and drop by the service garage of a General Motors dealer who is plugged into GM’s CAMS (computer-aided maintenance system). CAMS is a so-called expert system based on computer terminals in each repair bay linked by telephone to a mainframe computer in Flint, Michigan. ‘Expertise’ in the CAMS system on how to figure out what’s wrong with your ‘Chevy’ and how to fix it is distributed throughout this network, which even includes the on-board computer in each
GM car. The system is a learning loop: The garage mechanics learn from the computer-based network how to fix your car quickly and correctly the first time. But the new expertise acquired by the mechanics from their real experience with thousands of repairs each day is fed back to be 'learned' by the computer expert. Nobody calls CAMS (already training-edge technology) 'education' or 'training' or 'school'—learning is the system's business.

This kind of 'hypermated' learning loop increasingly forms the core of nearly every kind of economically productive activity. The London Stock Exchange has replaced legions of shouting floor traders with an automated telecomputing network, following the lead of America's NASDAQ. The most prosperous farmers today spend more time working with computers than with combines. Political humbug notwithstanding, factory 'jobs' are not coming back: They will eventually require as little labor as farming now does. General Electric's state-of-the-art light bulb factory in Virginia employs a third as many workers as the one it replaced—and none ever touches a light bulb. Each of the similarly few workers employed in Corning Glass's most modern plants is trained to be able to run every operation in the factory, not to do a 'job'. The work mainly is troubleshooting and managing the software of the automated systems that do the actual manufacturing.

This HL revolution cannot succeed through 'reform' or 'restructuring' of schools and colleges, any more than the horse could be re-trained or even genetically re-bred to become a car. 'Break-the-mould' schools can't and won't.

Tools, not schools, offer the key to the learning we all need to prosper in the knowledge-age economy. Sure, kids (and some adults) still need some kind of community centres for care, shelter and conviviality. But buildings are neither necessary nor sufficient for access to hyperlearning.

Public education has become a barrier to economic progress and a threat to social equality. The well-off will continue to get access to HL tools at work and at home no matter what. The $450 billion America is now squandering each year on education is depriving the less-well-off of access to hyperlearning—over 93% of that money is going to pay education's bureaucrats while only about 1% goes to hands-on tools and materials students can use for learning. A high-school student in a family with a $70,000+ income is about three times more likely to be using a computer for learning at home than a student in a $10,000-income household. Neither throwing more money at futile classroom tinkering nor vouchers for school choice will close that growing gap between the HL-rich and the HL-poor.

The solution is what I call 'microchoice'. It means commercialising, not just privatising, America's collective farms of the mind-public schools and colleges—to unleash the power of free enterprise to deliver more, better and faster learning opportunities at ever-declining cost to everyone. In practice, that means replacing government-run and -controlled institutions with electronic 'food stamps' for learning. Using modern card-account systems, such micro-vouchers would allow families to purchase the specific products and services for both adults and children to learn whatever they need from whatever sources can serve them best, whether commercial or non-profit.

The resulting US market for the most advanced and economically essential technology would be bigger than today's entire world computer industry. HL is thus both the greatest business opportunity since Rockefeller found oil and the indispensable boost needed to resuscitate our languishing economy.

That means we sit outside anything we're reading, and study can't get more 'objective' than that. But before Johnny is ready to distance himself from some demanding text, he must spend time in the position of the schoolchildren William Butler Yeats visited seven decades ago:

The children learn to cipher and to sing, To study reading-books and histories, To cut and sew, be neat in everything In the best modern way...

'Reading-books': what a phrase! We deduce that a reading-book is a book no one would read save under compulsion. It's a book from which to learn the technique of reading, a book devoid of reading's most powerful incentive, curiosity about what's in the next sentence. Dick and Jane and Spot, forsooth! And what's this? 'See Dick run.' Mere cogs and pinwheels. Talk about technology.

So much for the down-side. The obvious remedy for Dick and Jane is not abolition of books but better books. The book is not a problem, the bad book is. Likewise, plug-in technology need connotes no special problems. Like the book, we want it, but only if it's good of its kind.

What's it good for? One thing, interestingly enough, is getting the students going: not just sitting there, but joining in. In a class of 30, as every teacher knows, perhaps five or six will speak up. The rest will freeze, even if called on by name. Why they freeze we could speculate upon forever. Some feeling, perhaps, that breaking classroom silence is really a teacher's privilege? Fear of uttering something
their fellows will jeer at tonight? Uncertainty about the force of one's own voice in a group gathering?

Whatever the reason, here's one dramatic solution. I saw it work 18 months ago in an English poetry class at the University of Texas, Austin. Perhaps 20 of us sat around the periphery of a large square room. The lights were low, but not too low to read notes by. In front of each of us was a computer terminal: a keyboard, a big legible screen. And inconspicuous, part way down one side of the room, sat the instructor, John Slatin. (I'm proud to say, a one-time student of mine.) He wasn't dominating anything, no, just being a typist like everybody else. The discussion topic for the next hour was a set of poems assigned at the last class meeting. Anything typed by anyone would appear instantly on every screen. The instructor began by typing a greeting, then introducing a visitor (me). One outgoing student instantly sent me a 'Welcome!' Someone with a brief report was then invited to present it. Screenful by screenful, it popped up for us to browse in. Someone had a question, someone else a comment, someone else a comment on the comment... All this happened in silence, save for occasional laughter.

As you launched your contributions, the system automatically signed them with your name. It was soon evident that no one was hanging back.

One thing spelled out at the first class meeting had been that typing errors would always be disregarded. That had taken some students a meeting or two to get used to, but it served to remove what was seemingly their sole inhibition. Soon, unlike students offering oral answers, they weren't addressing the instructor, they were addressing one another. If Bill said something Sue wanted to modify, her response might begin, 'But, Bill... It's impossible to overemphasise how rare that is in 'normal' classrooms.

Impossible, too, to overemphasise how little the instructor needed a cattle-prod. If a thread started drifting in circles he'd redirect it; if a fact was undergoing conspicuous disregard he'd nudge it forward; if, making the most charitable allowance for typo's, he deemed a contribution impenetrable he might ask a mild question when no one else did. At the end he made a few summarising remarks and issued the next assignment. Then the lights went up.

The whole session was made possible by some custom software and a master computer called a file-server. That's a machine designed to distribute what's typed at numerous keyboards to numerous screens, all the while attending to such minor chores as affixing a signature to each keyboard's contribution. It also feeds the hour's doings to a storage file, from which a complete copy gets printed for each participant to keep. (So you needn't take notes; they get taken for you, and with guaranteed accuracy.)

Which brings us back to the strange fact that students in a group of 20 will type, for everyone to read, what they'd shrink from saying for everyone to hear. It's not that they're such good typists, such bad talkers. It's connected, I think, with the minimal involvement of just typing, exempt from regard for eye contact, for intonation, for vocal rise and fall. Voice has, as contrasted with typing, a nearly sexual intimacy, to keep you on guard. Or so it seems.

That class had to do with reading (bringing back to the human dimension) what Gutenberg technology had printed (placed in print's cold storage). A technology, then, was helping undo the side-effects of another technology. That may define more of education than we like to think. It may help us welcome, too, the less familiar faces of 'tech'.

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