way they use computers themselves: to entertain children at minimal cost to teachers. If children are turned loose to surf, then Internet in the schools won't be a minor educational improvement, it will be a major disaster. Another one. Just what we need.

The Learning Revolution

Lewis J. Perelman

This selection is taken from *Market Liberalism: A Paradigm for the 21st Century,* edited by David Boaz and Edward H. Crane, published by the Cato Institute, 1993. Lewis Perelman is author of the best-selling book *School's Out* (Avon Books, 1993) and principal of the Perelman Group, a consulting firm.

The collapse of the Soviet empire is just one of the most dramatic symptoms of the dawn of the new knowledge-age economy. One of the most critical of the many profound impacts of the technological revolution is the global obsolescence of traditional education and training institutions. Prosperity in the new economy depends on a complete replacement of worn-out public policies that are intended to subsidize and "save" those institutions. The new policy paradigm must focus on (1) abolishing the wasteful paper chase for academic credentials and (2) commercializing (not just privatizing) the economy of academia, the biggest and probably the last great empire on earth.

The New Economy

In the new economy being formed by explosive advances in information technologies, knowledge has become the crucial factor of production. Contrary to much of the conventional (and backward-looking) wisdom driving most recently proposed economic strategies, software has displaced manufacturing as the key to national economic strength, and learning has become the crucial form of work required for self-reliance and prosperity.

With learning now the indispensable focus of work, entertainment, and home life, the attempt to keep learning confined in the box of the government-controlled empire of school and college classrooms threatens to be as counterproductive as were political efforts at the beginning of the 20th century to protect the vast horse industry against the threat of the automobile.

National economic leadership, security, and prosperity at the beginning of this century depended on the swift, wholesale *replacement* of the horse-based transportation system by an all-new system based on the automobile (and shortly thereafter, the airplane). In the same way, economic progress in the 21st century will depend on the rapid replacement of schools and colleges—a $445 billion-a-year industry in the United States alone—by a new commercial industry based on the technology I call hyperlearning (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, electrical systems, 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 integration of skyrocketing advances in the so-called artificial intelligence of computers and robotics, broadband 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.

"Hypermated" learning loops increasingly form the core of just about 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 combines. Political rhetoric notwithstanding, factory "jobs" are not coming back: They are bound to become as productive, and hence as scarce and knowledge demanding, as farm jobs. General Electric's state-of-the-art light bulb factory in Virginia employs one-third the number of workers employed by the factory it replaced—and none ever touches a light bulb. Each of the 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 is primarily troubleshooting and managing the software of the automated systems that do the actual manufacturing.

The HL revolution cannot be brought about by any "reform" or "restructuring" of schools and colleges, any more than the horse could be retrained or even genetically inbred to become a car. "Break-the-mold" schools can't and won't.

Education: A Barrier to Progress

A critical feature of the new world order marked by the collapse of socialism is that education, once widely viewed as an engine of prosperity, has become the major *barrier* to global economic progress.

The *overeducation* of the workforce is one of the major causes of the economic slump that has plagued the U.S. and other modern national economies for some three years. Roughly three-quarters of the thousands of employees being eliminated by major employers such as IBM, General Motors, and TRW are managerial, professional, and technical workers with extensive college and postgraduate education. In the present recession, corporate middle managers have been 2.5 times more likely to become unemployed than the average worker. In past recessions, laid-off factory workers were rehired when sales recovered, but the recent rapid growth of white-collar unemployment represents the permanent elimination of jobs. In the recession of the early 1980s, white-collar employment kept on growing, and 90 percent of white-collar employees who lost their jobs were rehired within a few months. In the latest recession, white-collar employment has declined, and fewer than 25 percent of the displaced white-collar workers have been able to find new jobs.

Recent political campaign proposals called for more "investment" in the U.S. workforce in the form of expanded spending on traditional education and training programs. The rhetoric masked the reality that the United States currently has the most highly schooled workforce in its history: From 1970 to 1989, workers with four years of high school increased from 31 to nearly 39 percent of the workforce, and the proportion of the U.S. workforce with at least four years of college nearly doubled from less than 11 to over 21 percent. Fewer than 23 percent, and probably no more than 15 percent, of U.S. jobs will call for college degrees in the 1990s. With over a quarter of the workforce planning to earn college diplomas, it is likely that 10 percent of U.S. college graduates will be unemployed by the end of the decade, and between a quarter and a half of the graduates will be underemployed in jobs that do not really require their degrees.

The ongoing deflation of academic credentials will only be accelerated by the end of the Cold War. In the wake of the "brain glut" unleashed by the collapse of the Soviet Union, U.S. companies such as AT&T, Corning, and Sun Microsystems have been hiring top Russian scientists and engineers, among the best educated and most skilled workers in the world, to work in Russia for salaries on the order of *$60 a month*. And some 2 million of America's own most technically schooled and skilled workers are destined to become unemployed over the next two years as a result of defense spending cuts and force reductions.

A prime flaw in the whole educational system is that it was designed in the midst of the Industrial Revolution of the 19th century to prepare people for industrial-era jobs. But the kinds of skills required to work productively in the knowledge age are almost the opposite of the skills demanded for academic success. And the message buried in the statistics is that "jobs" for both the over-schooled and the unschooled are fast disappearing. Entrepreneurial skills are the ones most needed in the new economy, where the majority of the "workforce" will be made up of contractors, consultants, free agents, and traditional business creators and owners. Yet the competencies needed for successful entrepreneurship are almost totally ignored by the existing educational and training system.

Even as the services of the scholastic sector become increasingly irrelevant to the economic aspirations of the great majority of Americans, the cost of the obsolete academic bureaucracy continues to soar. Add the $50-billion-plus that employers spend to educate employees to the $450-billion annual school and college budget, and throw in at least another $100 billion a year spent on "hidden" forms of education (such as conferences and conventions), and the education sector is virtually tied with the health care sector as the biggest industry in the U.S economy.

The upward spiral of costs has been almost as explosive in education as in health care. Real spending per student in U.S. K–12 schools (discounting inflation) has grown some five times since the 1950s. In the 1980s real U.S. spending on K–12 schools grew by nearly a third; spending on colleges grew even more, by about a half.

Productivity, the key issue that has been neglected by education and training policies, needs to be the focal point of the new policy paradigm. Growth in productivity—increasing the amount of wealth produced by each hour of labor—is the essential measure of a nation's standard of living and relative "competitiveness." Weak growth

in productivity has been the central symptom of America's economic malaise for some two decades.

Poor and declining productivity is the main reason the education sector has become a barrier and a threat to economic progress in the modern world. Education as an industry is nearly twice as labor intensive as is the average U.S. business, and its relative labor costs are more than twice those of high-tech industries such as telecommunications. Moreover, while the productivity of other information-based industries has been advancing smartly, even explosively, the soaring costs and stagnant output of the education sector have spelled a steady decline in productivity at least since the 1950s.

The sheer size of the education sector, America's first or second biggest industry, thus has been dragging down average growth in productivity. And education is undermining the national standard of living even more because, in addition to being a very large business, it is one that is strategically critical to the growth of a knowledge-age economy. With the learning enterprise playing the central economic role in the knowledge age that steel making played in the industrial age, a weak and declining learning sector is undercutting the development of nearly every other modern business.

The productivity-focused goals of the new paradigm of national learning policy that should replace intrusive and irrelevant "national education goals" can be summarized in four simple words: More, Better, Faster, and Cheaper. That is, policy needs to ensure the rapid development of HL systems that enable citizens of all ages to learn more about everything; to learn better, especially those things that are relevant to productive work; to learn faster, with less waste of time; and to do all that at lower and steadily declining cost.

HL technology already exists and is achieving those productivity goals in the segments of the national learning enterprise that are compelled by competitive forces to seek more and better learning in less time at lower cost—notably, in corporate and military organizations. For instance, U.S. corporate and military educators spend about 300 times more of their instructional budgets than public schools do on systems based on increasingly advanced computer and multimedia technology. The reason is that, in the competitive environments of the marketplace and the battlefield, learning objectives are focused on competency rather than credentials, and there are powerful rewards for productivity and thus for innovation.

The Action Plan

The national action plan needed to replace the worn-out and outdated education establishment with a 21st-century HL industry has four key strategies.

Decredentialize

First, America needs to eliminate the economic value of academic credentials. Credentialism has been the key barrier that has thwarted a half-century of attempts at educational reform and restructuring. As long as the public has reason to believe that elite academic credentials—based on attendance at the "right" institutions—are the essential passports to lucrative employment and other economic opportunities, the public will continue to resist any reform that gives learning and competency priority over testing and sorting. As long as public policy continues to presume that the cognitive needs of the "work-bound" population warrant categorically different, and hence inferior, treatment than those of the "college-bound" population, expenditures on education will continue to undermine rather than strengthen economic progress.

The economically productive alternative to credentialism is certification of competency. In short, people's opportunity to participate in employment or entrepreneurship should be based only on what they know and what they can do. There is simply no job or enterprise in this economy that truly requires an academic diploma or degree for successful performance. As Chief Justice Warren Burger wrote in the landmark civil rights case of *Griggs v. Duke Power,* "History is filled with examples of men and women who rendered highly effective performance without the conventional badges of accomplishment in terms of certificates, diplomas, or degrees."

A broad, even universal, commitment on the part of U.S. employers, as well as financing and other institutions, to eliminate the currency of diplomas would lead necessarily to a huge demand for effective tools to assess the know-how of applicants for jobs, small-business loans, and so forth. Sophisticated assessment tools already exist and are being used by leading employers such as the U.S. Army, Corning, Allstate, and Toyota. Making competency-based employment (and other economic access) a universal practice would spawn the rapid growth of a high-tech, profitable, cost-effective assessment industry. Funding for that new industry would come from some of the hundreds of billions of dollars

that would be saved when tax and tuition payers were freed from paying tribute to the diploma mills.

There are several steps the new president should take to help achieve the goal of a diplomaless economy.

Federal Employment and Contracting. As the nation's biggest employer, the federal government should demonstrate its commitment to decredentialization by reforming its own employment and contracting practices to eliminate all requirements for and references to scholastic diplomas and degrees. Military and other federal agencies already are more advanced than many other employers in relying on competency-based employment and training procedures, so the scope of this reform is not likely to be drastic. Much of it probably can be achieved by executive order, although some new legislation may be required to reconcile competency testing with civil rights law.

"SCANS II." The Secretary's Commission on Achieving Necessary Skills (SCANS), which was convened by Secretary of Labor Elizabeth Dole and included representatives of a range of American industries, worked productively from 1990 to 1991 to define a set of competencies needed for employment in the modern economy, as well as criteria for assessing those skills. The new administration should help move the SCANS work from theory to practice by inviting U.S. employers, either through trade associations or individually, to join a coalition pledged to implement the kind of competency-based employment practices suggested by SCANS within a reasonable period of time—say, by January 1, 1995. The coalition could establish an oversight committee or council to monitor progress and to target regulatory or legal barriers that the government needs to reduce. The president also might establish, either through an executive agency or the employer coalition, something like the Baldridge Award (for quality management) to acknowledge leaders in competency-based employment.

Civil Rights. The new president should order the Justice Department to review existing civil rights laws and regulations to determine to what extent employment discrimination based on academic diplomas may be in violation of the law.

Assessment Research and Development. Through executive directive and whatever enabling legislation may be necessary, the new president should

establish a new federal program of research and development on human performance assessment, aimed at advancing the cost-effectiveness of the technology needed to measure what people know and can do in the context of real work requirements. The program might best be centered in the National Institute of Standards and Technology (Commerce Department)—with active collaboration of the Defense Department (e.g., the Defense Advanced Research Projects Agency, the Office of Naval Research, and the Army Research Institute) and the National Science Foundation—or in the new Department of Knowledge Resources suggested below.

Entrepreneurship. The new president should order that, in all the above initiatives and others, preparation for and competency at entrepreneurship should be given priority at least equal to or greater than that given to employment.

Commercialize

In recent years many politicians, business leaders, and families have begun to appreciate the essential importance of breaking up the socialist monopoly of the government-controlled education system. "Privatization" of public education is much needed and should be a national goal of the new president. But "school choice" is an inadequate strategy for achieving the benefits of a market economy in the learning sector or for unleashing the growth of the strategically crucial HL industry.

In a long list of problems, the primary flaws in the school choice (including college choice) strategy are *vouchers* and *nonprofit organizations.* Because classroom teaching is technologically and economically obsolete in the HL era, choice in the form of vouchers for tuition at present-day schools is as irrelevant to hyperlearning as the choice of horses is to modern transportation. Because the commercial profit motive is absolutely indispensable to drive the rapid technological innovation the HL era demands, choice programs that merely redistribute public moneys among nonprofit schools—whether government owned, private, or church affiliated—are bound to be irrelevant and ineffectual.

Instead, the new administration should be committed to *commercial* privatization of the entire education sector, based on a strategy of *microchoice* using the financing mechanism of *microvouchers.*

To illustrate the idea of microchoice: If our choice of television channels worked the way school choice is proposed to, changing channels

from HBO to CNN would require unplugging the TV set, taking it back to the store, exchanging it for a different model, and moving to a new neighborhood. In reality, of course, choosing among dozens or hundreds of video options requires no effort more strenuous than pushing a button. Similarly, modern HL technology can offer the individual even more choices of "teachers" and "schools" than of cable TV channels. HL's broadband, intelligent, multimedia systems permit anyone to learn anything, anywhere, anytime with grade-A results by matching learning resources precisely with personal needs and learning styles.

Microvouchers that use modern electronic card–account technology can enable individual families or students to choose specific learning products and services, not just once a year or once a semester, but by the week, day, hour, or even second by second. Unlike vouchers for school or college tuition, microvouchers will create a true, wide-open, location-free, competitive market for learning that has the elasticity to efficiently and quickly match supply and demand.

Over 90 percent of funding for U.S. public education is supplied by state and local governments, which also have the major policy-making role. Nevertheless, there are several steps the new president can take to commercialize the government-controlled education sector and to promote the development of the American HL industry that must replace it.

Federal Microvouchers. The new president should seek legislation to merge 90 percent of the existing student loan, Pell grant, Job Training Partnership Act, Trade Adjustment and Assistance Act, Job Opportunities and Basic Skills program, Chapters I and II of the Education Consolidation and Improvement Act, and other federal education and training funds into a single, means-tested microvoucher program that eligible families or individuals could draw on to meet the learning and development needs of people of all ages. Funds should be allocated directly to households, in proportion to individual or family need, to be used for the purchase of any service or product that is demonstrably relevant to learning and development needs. The instrument of expenditure would not be paper stamps or vouchers but electronic account cards similar to credit or bank cards. The HL microvoucher program should leave families free to decide how best to distribute the account resources between adults and children and generally among the members of the household. That provision would recognize that the needs of disadvantaged children in many (perhaps even most) cases may be served

best by immediately improving the economic opportunities and status of the parents, as well as by developing the parenting skills.

Family Learning Account. As a complement to the means-tested microvoucher program, the new administration should consider adding a tax-exempt saving program. Individuals should be permitted to make contributions to Family Learning Accounts (FLAs). Those contributions, which would be similar to contributions to Individual Retirement Accounts (IRAs), would be deductible from taxable income, up to some reasonable level, during the year the contributions were made. Unlike withdrawals from IRAs, withdrawals from FLAs would be exempt from both penalty and tax as long as they were expended through the microvoucher program. And such microvoucher expenditures could be repaid to FLAs (with interest) without being counted against the annual contribution limit. Beyond some age limit, provision may be made for FLA funds to be transferred to estates or pension accounts, with appropriate treatment of deferred taxes. Another difference from IRAs would be that FLAs would be designed to serve family rather than just individual needs. The general concept of the FLA is to encourage households to gradually replace the direct government grant funds in microvoucher accounts with tax-favored savings contributions.

Leveraging. Federal funds for education and training represent only about one-tenth of total public expenditure on those areas. A federal-only microvoucher program would, therefore, provide significant benefits only to the most disadvantaged portion of the U.S. population, although it would give the poor more of the freedom of choice and access to learning tools that the well-off already enjoy.

Although most of the economic problem caused by an obsolete, overfunded public education bureaucracy lies in the domain of state and local authorities, the president can use the power of the federal government to influence the direction of state policy. Specifically, the new president should consider making part or full eligibility for the consolidated federal microvoucher–FLA program dependent on state and local participation. The precedent for such a policy exists in a variety of federal transportation, welfare, health, and other programs. For instance, federal law required states to raise the legal drinking age to 21 to be eligible for federal highway funding. The new administration should determine whether such a policy may be necessary, in addition

to the oft-cited "bully pulpit," to induce states to reconstruct their education budgets and bureaucracies along the lines recommended here.

Capitalize

The nearly total absence of investment in research, development, and implementation of new technology may be the main reason the education sector is a barrier to the growth of the HL industry and a brake on our whole economy. While the average U.S. business spends 2 percent of its annual revenues on research and development (R&D), and leading high-tech companies plow 7 to 20 percent or more of their annual sales receipts into R&D, the education industry invests less than 0.1 percent of its revenues in the research and development of new, improved technology.

The health care sector, which is essentially tied with education as America's biggest industry, spends about $18 billion annually on R&D; roughly half of that amount comes from government, and the other half comes from companies. In contrast, only about $300 million is spent annually in the United States on research and development of advanced learning technology, and virtually all of that amount is spent by the Defense Department. Another $2 billion a year for the development and acquisition of associated training systems may be hidden in DOD weapons budgets. Defense cutbacks threaten to wither that critical national technology asset, and currently there is no plan to preserve, much less expand, it.

Equally dismal is the education sector's record on capital investment—money that pays for the acquisition and application of technology to improve the quality of products and the productivity of operations. The average American business invests about $50,000 in capital for each job. In high-tech industries, such as computers or telecommunications, from $100,000 to $1 million needs to be invested for each worker. In the education sector, total capital investment per employee is less than $50.

The funding needed to close the yawning technology gap is on the order of $8 billion to $20 billion a year and should come entirely from the reallocation of some of the $445 billion now being wasted annually on the nation's obsolete and bloated education system.

Again, the federal government accounts for only a small fraction of the total funds spent on public education and training in the United States. If the technology gap is to be closed by reallocation from existing expenditures, it follows that most of that money will have to come from state and local rather than federal sources. This is an area in which the new president can and should use federal influence to leverage state policies.

National Institutes of Learning. Part of the 10 percent of existing federal education and training program funds not applied to the microchoice program discussed above should be used for challenge grants to reward states that agree to set aside at least 2 percent of their total current state (and local) education and training budgets for HL research and development. The challenge grants might represent a federal supplement of 10 percent or more to state R&D allocations. The R&D funds should be administered by state Institutes of Learning.

As the states implement the new policy, the state institutes should form a consortium, which could be called the National Institutes of Learning, perhaps with the federal government acting as coordinator. Although government organizations cannot and should not duplicate the product-development role of commercial business, the mission of the National Institutes of Learning should be, from the outset, to realize the ultimate goal of commercialization of advanced learning (that is, HL) technology.

Commercialization necessarily implies effective cooperation between government R&D programs and private industry. The U.S. agricultural research system and the federal Small Business Innovation Research program are two rather successful models that might be productively adapted to this new endeavor.

Learning Redevelopment Banks. The remainder of the 10 percent reserved from current federal education and training funds should be used for another matching grant program to induce states to set aside at least another 3 percent of their total current state (and local) education and training program budgets to help finance the reconstruction of the education sector's socialist economy. Education needs the same kind of major capital investment that other ex-socialist economies need to replace obsolete technology and retrain managers and workers who have little experience with or understanding of market operations. Those funds should be administered by redevelopment banks that, like the World Bank or the European Bank for Reconstruction and Development, will provide loans and grants to help replace government-controlled institutions with private, competitive, profit-seeking enterprises. Those funds and financial institutions need not and probably should not be permanent—a "sunset" provision that would shut them down after no more than 10 years should be included in their charters. But they should be given adequate funding and a long enough lifetime to speed the commercial privatization of the education sector.

Bypass

The huge, century-old Bell Telephone monopoly was forced to break up a decade ago largely because it was bypassed by new technologies that enabled consumers to get superior products and services from other suppliers. Today, "distance learning" technology—using telecommunications and other media to deliver instructional services and resources from anyone, anywhere to anyone, anywhere—is well enough established in America to start to topple the public education monopoly in a similar way. Along with the variety of private school options, the expansion of distance learning will increase the ability of learning consumers to bypass the control of the public school and college bureaucracy, thereby shrinking the government system's client base and reducing its ability to resist the kinds of policies called for above.

In general, the new administration should pursue a strategy of expanding the ability of learning consumers—both families and businesses—to bypass and abandon the established education system in favor of budding HL alternatives. That strategy requires acting swiftly to redistribute consumers, finances, and political influence from the scholastic institutions of the past to the HL enterprise of the future.

Break the Telecommunications Logjam. There is an intimate connection between the creation of the broadband, digital, so-called "information superhighways" needed to form the strategic infrastructure of the knowledge-age economy, on the one hand, and replacement of the medieval scholastic establishment by a high-tech HL industry, on the other: The more rapidly high-capacity, multimedia networks are expanded nationally, the sooner they will bypass and replace academia. And the commercial privatization of the education sector represents a multi-hundred-billion-dollar market opportunity for private investment to reap the rewards of the information superhighway system.

Thwarting both developments is an ongoing stalemate among telephone, cable TV, broadcast, newspaper, and other media interests that have been vying for control of the new communications infrastructure. The new president should act aggressively to end that gridlock by convening a national "summit" meeting of the interested parties and pressing them to forge an effective consensus that can be enacted in federal legislation.

End Direct Institutional Aid. Pending the broad restructuring of federal program funds into the microchoice program described above, the new pres-

ident should take whatever actions may be necessary to end the allocation of federal funds directly to schools and colleges for instruction-related purposes (as opposed to research grants). The tax exemption of supposedly not-for-profit institutions also should be ended. The idea is to direct funds to the greatest extent possible into the hands of consumers rather than to school and college bureaucracies and to eliminate the tax subsidies that favor would-be nonprofits over commercial suppliers.

Federal Reorganization. Finally, the new president should use his authority to reorganize the executive branch to reflect the technological and economic opportunities of the future rather than the special interests of a fading era. Specifically, the president should create a new Department of Knowledge Resources by merging the Education and Labor departments, the National Science Foundation, the Federal Communications Commission, the National Aeronautics and Space Administration, and part or most of the Department of Energy's national laboratories. The administration also should consider including other relevant research- and knowledge-oriented organizations, such as the Commerce Department's National Institute of Standards and Technology, National Oceanic and Atmospheric Administration, and Census Bureau. The president also should encourage Congress to revise its committee structures along similar lines.

Conclusion

America was founded by people who had the vision and audacity to overthrow tradition and to establish an unprecedented political community, grounded in the radical principles of human liberty and equality. We have now entered a new era when the fabric of whole societies is being rewoven around the world. From Berlin to Vladivostok and from Capetown to Buenos Aires, every major social structure is subject to reappraisal, redesign, and replacement.

Inevitably, the challenges of the dawning knowledge age will demand that the most conservative social glue, education, be reinvented as well. The same HL technology that is driving the overthrow of arthritic bureaucracies holds the key to achieving social reformation swiftly and productively. America's political legacy, her technological vitality, and her responsibility as the world's greatest power all demand that she lead the hyperlearning revolution that promises a new birth of freedom, prosperity, and peace.