The attack on U.S. schools: How will they survive?

by Marianna Wertz and Marcia Merry Baker

The system of public education, the foundation stone of any democratic republic, is almost universally acknowledged to be failing in America. The headlines out of Littleton, Colorado were only the latest spur to action. Solutions are being debated in virtually every city, county, and state, where school funding makes up the lion's share of the budget.

It is our purpose here to discuss what that solution should be, proceeding by answering three questions: 1) What is the real problem with our schools? 2) Are the proposed solutions actually good? 3) What is the basis for a sound public education?

We begin by listening to the wise words of our Founding Fathers, who stressed the importance of good public education for the nation's children—its future citizens and workforce. Both Benjamin Franklin and George Washington warned that a good public education is the sine qua non of a free nation. "The good Education of Youth," Franklin wrote in his 1749 Proposals Relating to the Education of Youth in Pennsylvania, "has been esteemed by wise Men in all Ages, as the surest Foundation of the Happiness both of private Families and of Common-wealths. Almost all governments have therefore made it a principal Object of their Attention, to establish and endow with proper Revenues, such Seminaries of Learning, as might supply the succeeding Age with Men qualified to serve the Publick with Honour to themselves, and to their Country." Washington, in his Farewell Address to the Congress, proposed the establishment of a National University and a Military Academy to guarantee "the common education of a portion of our Youth from every quarter" to be trained in "the science of government," because "the more homogeneous our Citizens can be made in these particulars, the greater will be our prospect of permanent Union."

1. What is the problem?

As we begin to identify the nature of the problem besetting our public education system, it is best to keep in mind that Franklin and Washington had to lead a revolution against the British oligarchy, before they could create a republic in which their concept of public education might flourish. That revolution is by no means over, and its final victory is actually the key to success today in saving that system.

The first, and overriding problem confronting states and municipalities in America is the lack of adequate resources to build and maintain the education infrastructure. Looked at from the standpoint of Lyndon LaRouche's "Triple Curve," or "Typical Collapse Function," despite the bubble on Wall Street and consequent explosion of financial instruments, the erosion over the last 30 years of real living standards, which provide the tax base for local and state revenues of all kinds, has fueled a virtual citizens' revolt against school bonds and taxes to finance schools. This is exacerbated by the aging of the population, under Malthusian policy strictures, with senior citizens increasingly unwilling, and unable, to finance schools for others' children, while the size of the parent-age population is too small to adequately fund their children's educational needs. The result is that the physical infrastructure of the nation's schools is falling apart, and what there is, is woefully inadequate.

A February 1995 General Accounting Office (GAO) "School and Staffing Survey," the first national survey of the physical condition of schools conducted since 1965, showed the following:

- During the 1994-95 school year, a total of 86,221 U.S. public schools served 44.1 million students. Enrollment in public elementary and secondary schools rose 16% between 1985 and 1996. In that same time period, there was a total of 4.97 million students enrolled in 26,093 private elementary and secondary schools, of which Catholic schools accounted for 51%, while other religious schools accounted for 34%, and non-sectarian schools claimed at 15% share.
- One-third of U.S. schools require "extensive repair or replacement of one or more buildings."
- Almost 60% of U.S. schools have one major building which needs "to be extensively repaired, overhauled, or replaced."
- About half of U.S. schools report having at least one unsatisfactory environmental condition, such as poor ventilation, heating, lighting, or poor physical security.
- An estimated \$112 billion is needed to repair and upgrade U.S. school facilities to a satisfactory condition.

Many school officials told the GAO that their districts have been forced to defer "vital maintenance or repair expenditures from year to year due to lack of funds." They cite the refusal of citizens to accept new taxes or pass new bond issues to generate the funds required to provide children with an acceptable learning environment.

In a second report, in April 1995, the GAO focussed on the capability of the nation's schools to provide proper forums



The overriding problem confronting states and municipalities in America is the lack of adequate resources to build and maintain the education infrastructure. Here, students at a Pittsburgh elementary school study biology, in a program funded by the Bayer Corporation.

for the teaching of skills needed for the 21st century. The results were equally shocking:

- About 40% of U.S. schools do not have proper laboratory facilities in which to convene science classes, affecting some 14 million American students.
- One-quarter of the nation's schools do not have enough computers for students, and over half of all schools lack modems for their computers to communicate with outside resources.
- Every U.S. city operates with school facilities that were built during the 1920s and 1930s public works programs, and which should have been replaced beginning in the 1970s. The GAO found some school buildings still in use which were more than 100 years old.
- Many schools built in the 1960s and 1970s were designed to have a useful life of only 20 to 30 years, and are sometimes in even worse physical condition than schools that are much older.
- A particularly glaring problem is the temporary classrooms that many schools erected to handle the baby boom in the 1960s. Many schools are still using these temporary classrooms, designed to last only ten years.

Indicative of the larger problem of which the school breakdown is a symptom, when *EIR* called the GAO for this article, to see if these studies had been updated, we were told to call back in a few days because the GAO's own infrastructure—its computer database—was broken.

Breaking the bubble illusion

Some loudly proclaim that this deterioration will soon be solved, with the advent of "good times" on Wall Street. Over half the states and localities across the country are proclaiming official budget "surpluses," some equal to 9% of expendi-

tures. New York claims a \$1 billion surplus, and California, a \$4.3 billion surplus. But, as 50,000 teachers and other workers told New York Gov. George Pataki on May 12, at the biggest demonstration in decades in New York City, the "surplus" is the result of decades of austerity and cutbacks in wages and benefits to municipal workers, as well as a huge deficit in city infrastructure construction, repair, and upkeep.

Republican governors like Pataki want to give that "surplus" back to the taxpayers—to solidify their voting and funding base among the wealthy. To the contrary, as Lee Saunders, who heads the American Federation of State, County, and Municipal Employees (AFSCME) union in New York, told demonstrators: "We say to the Mayor [Rudolph Giuliani]: Stop giving tax breaks to Wall Street and the rich. Instead, invest the city's surplus where it will do the most good. Invest it in the city workforce—then New Yorkers will get a real return for their dollar."

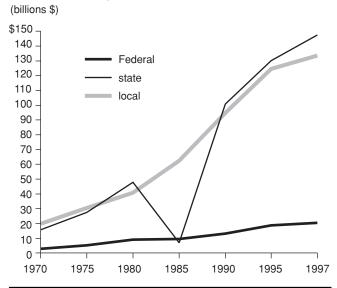
In California, where the national tax revolt began as the state's industrial base began to erode, even with the huge "surplus," the state budget today allocates more for prison construction than for education.

Figure 1 shows the relative share of public school financing, from 1970 to 1997, among Federal, state, and local funding. The Federal portion has grown relatively little. Overall, both state and local outlays have soared. **Figure 2** shows the wide variance between states, in what is spent per pupil in the school year. On the high end are expenditures in the range of \$7,500 to \$10,400 per pupil (in average daily attendance), such as in New Jersey, Pennsylvania, and New York. On the low end, are expenditures around \$4,400 per pupil, such as in Mississippi, Arkansas, and Oklahoma. The variation from county to county is even more extreme.

However, apart from policy questions posed by these pat-

FIGURE 1

Relative share in financing public elementary and secondary schools



Source: U.S. Statistical Abstract, 1995, 1998.

terns of disparity, the immediate issue for school districts is, what happens to state and local revenues for schools as the economic base collapses?

New Hampshire and Tennessee

Since the bubble economy cannot produce a reliable tax base, states and municipalities have turned to rely increasingly on nuisance taxes and gambling—both regressive economically—to avoid overtaxing an already-overtaxed middle class.

The states of New Hampshire and Tennessee are extreme examples of this problem. Neither state has an income tax, and both are now facing possible large-scale layoffs of teachers and school personnel, while the legislatures struggle to find a source of funding.

EIR spoke with legislative leaders in both states (see accompanying interviews) to get a sense of how the problem is being handled.

In New Hampshire, last year the state Supreme Court ruled that the system of financing schools through local property taxes was unconstitutional because it discriminated against children in poorer districts. The state legislature had till April 15, 1999 to come up with a solution. Having failed to do that, the deadline was extended to May 15. As former State Rep. Bill McCann told *EIR* (see interview), the legislature failed again, patching together a series of new taxes that is still \$100 million short of the \$825 million is required to meet the court's definition of an "adequate education" for every child. Gov. Jeanne Shaheen (D), who said she will veto any income tax, stumped the state for video gambling as a

source of funding, but that, fortunately, was rejected.

The budget plan which passed the legislature on April 30, inadequate as it is, will undoubtedly now also face numerous court challenges, as McCann points out. Objections will come from property-rich towns facing higher tax bills, and from property-poor towns, which originally sued to force sweeping tax reform and now claim that the plan doesn't provide nearly enough education aid or tax relief.

In Tennessee, a budget was approved by the House on May 24 (after our interviews), which cut \$26 million for cost-of-living raises for state employees and teachers. Linda Mc-Cartney, executive director of the Tennessee State Employees Association, objected to the cuts, saying, "The workload is horrendous and the turnover rate is so high and the wages are so low it is difficult to find anyone to work." The Senate has not yet passed a budget.

In his talk with us, Rep. Ulysses Jones refers to the allure of gambling in nearby Tunica, Mississippi, which is being pointed to as the solution for the education funding crisis in Tennessee. But, the fact of the matter is, that while Tunica has been able to fund its schools adequately as a result of gambling revenues, pupil test scores in Tunica are still the lowest in the state, and more than half of high school pupils still drop out. In 1997, the state education department took over administration of Tunica's schools.

Social breakdown

A second, and related cause of the problem facing our schools is the breakdown of the family and traditional social networks in late-20th-century America. The recent "Kids Count" study by the Annie E. Casey Foundation (see box) points to the evidence of that societal breakdown. The survey found that 9.2 million American children—one in every seven—have at least four of the risk factors, a level which the foundation considered to be the threshold for considering a child to be at the greatest risk.

Recent studies have also pointed to the fact that a full onequarter of American children live below the poverty level, including suffering malnutrition from lack of adequate food.

The breakdown of familial care for children is a direct result of the real economic crisis. Because it now takes 2.5 jobs to sustain the same level of income per household that could be sustained with one job 30 years ago, children are growing up without parental guidance. A study released in mid-May by the President's Council of Economic Advisers reported that the share of married women who have children under 18 at home and who work for pay, rose to 68% in 1996 from 38% in 1969, from 622 hours worked annually in 1969 to 1,197 hours worked in 1996. Schools cannot be expected to make up for this level of parental absence in the lives of their students.

While schools can't replace absent parents, the Holly-wood Satanic culture is attempting to do just that, on television, in the movies, and on the Internet, with the results far too obvious (see article by Anton Chaitkin, this issue). By the

ND SD WY ้ทง NE UT ОН \$10,284 co МО \$3,822 KS \$3,822 NC TN AR TX SC \$4,486 \$4,498 GA AL Key MS Over \$7,000 LA \$4.35 \$5,540-6,999 Under \$5,540

FIGURE 2
Wide variation in average per-pupil expenditure, by state, 1997

Source: U.S. Statistical Abstract, 1998.

fifth mass killing in an American school, it has become clear that we are confronting an organized enemy of public education, bent on destroying trust in schools and their ability to safeguard the lives of their students.

A nationwide study by the independent Public Health Policy Advisory Board, released two weeks after the Littleton massacre, reported that adolescent homicides and suicides now are the number-two and -three causes of death among all U.S. children, aged 1 to 19.

Even when children are in the classroom ready to learn, they still confront the problem of *what is being taught*. Two recent studies indicate the nature of this problem.

On May 26, the results of a new English test given to New York State students last January were made public. The new test replaced the former multiple choice test—now standard in American education—with a three-day marathon that required children to read long passages and write essays. The result: Only 5% of New York students statewide achieved advanced levels. Even affluent suburban districts, which were accustomed to seeing more than 90% of their students pass multiple choice tests, saw the results plunge into the 60s and

70s percentile. In New York City, 2 out of 3 students, 67%, failed to meet the minimum state standards.

As Lyndon LaRouche has charged for more than two decades, unless education begins with the child replicating the experience of creative discovery in his or her own mind, it is not education. Learning to answer multiple choice tests prepares the child only to take such tests—not to think.

Another indication of the lack of ability to think among young people, is provided by the pattern of results on tests routinely taken by those entering military service. **Figure 3** shows which states rank the highest in results on the Armed Forces Qualification Test, which is used to test the competency of men and women entering the Armed Forces in areas that will be required for military duty. It is generally regarded as an indicator of educational ability for the nation's youth. The highest scores are in those states with farming and other activities engaging young people in thinking (North Dakota, Wisconsin, Minnesota, and so on). The lowest are in poor states (Mississippi, Louisiana, Alabama), and also in heavily populated states with poor urban areas (New York, California).

SD UT IL ОН СО МО KS KY NC OK TN AR TX sc GA ALKey Highest third LA Middle third Lowest third

FIGURE 3
Where Armed Forces Qualification Test scores are higher, ranking of states, 1995

Source: Congressional Quarterly.

2. 'Solutions' worse than the disease

There are two basic approaches being debated across the nation as the "solution" to the education crisis. The first, a key theme of the Republican free-enterprise camp, focusses on state-funded vouchers and charter schools. Both are means of slipping privatization in through the back door. The second, on which the Al Gore Presidential campaign has hooked its hopes, is that putting all of America's schools on the "Information Superhighway" will solve the problem that so many children aren't learning fundamental literacy. Both approaches are fundamentally flawed.

The recent fight over vouchers in New Mexico provides instructive insight into the real issues involved. New Mexico became a test case for state funding of vouchers to send children to private schools when Gov. Gary Johnson (R) threatened to veto the entire state budget and shut down the schools if the legislature refused to pass his voucher plan. Politically charged testimony and debate ensued for weeks, ending on May 11, with 10 House Republicans and 5 Senate Republicans voting with the majority Democrats in a veto-proof rejection of the plan. The heat of the debate was indicated by a

statement issued by the state AFL-CIO Committee on Political Education (COPE) Director Mike Shea, who compared Governor Johnson's bullying of the Republican legislators to the "dictatorship" of Mussolini or Hitler.

Opponents cited their fear that state funding of private schools will undermine public education, that private schools do not face the same level of state scrutiny as public schools, pay their teachers less, do not have to be accredited, and could discriminate based on religion or disability. Many parents rejected the voucher proponents' argument that public schools are failing their children, urging that it is the failure to adequately fund the public schools that is the root of the problem, not the fact that they are public.

The Albuquerque Tribune editorialized against the voucher plan, calling it "potentially unconstitutional" and countering the "myth" that "all we do is throw money at public schools." The truth, the editorial said, is that "New Mexico has spent decades nickle-and-diming its educational commitment with the result that our teachers are among the nation's worst paid, our schoolhouses are in dangerous disrepair, and nearly every request for true reform is met with the same reply: We

don't have the money."

On the pro-voucher argument that the public school educational establishment is only interested in "protecting its monopoly," the *Tribune* wrote: "Few people embrace a career in education because of the power, money and glory it bestows upon them! Although poor performers exist, as they do in any industry, the majority of educators are committed professionals grappling with the increasing demands that they not only educate a cihld but serve as social workers, police officers and health-care providers."

Perhaps most interesting in the debate, the representative of the Catholic Church, which runs the majority of the state's private schools, opposed the voucher plan. Roberto Ortego, who speaks for the state's three Catholic dioceses on educational matters, testified, "We can't just look out for our own interest in this debate. We have to look out for all children." Ortega was joined by Rabbi John Feldman, who testified that vouchers would divide students and funnel most of the program's money to religious schools.

The Gore-y Superhighway

Al Gore's "Information Superhighway" has had a lot of human roadkill on it recently. As Chaitkin's article makes clear, the Internet has become home to a nest of Satanic groups intent on turning the nation's children into practicing Satan-

Rise in number of computers for student instruction in public schools, 1984-98

	1984-85	1997-98
Number of computers		
in public schools ¹	569,825	7,415,007
Students per computer ²	63.5	6.3

¹ All grades

ists. The recent school shootings are evidence of their relative success to date.

But there is a deeper level to the problem presented by the proposal to hook every school into the Internet as the solution to the nation's education problem. This is made clear in the May-June *American Scientist*, in an article by civil engineer and historian Harry Petroski (see box). Virtual reality cannot teach a child to think; information is not the same thing as knowledge.

Table 1 and **Figure 4** show the rapid rate at which class-rooms are being installed with computers and Internet access. The student-to-computer ratio has gone from 63.5 in 1985 to

'Kids Count' shows scope of crisis for U.S. children

The Annie E. Casey Foundation, a private charitable organization, funds studies and programs dedicated to relieve problems among disadvantaged American children. Their most recent 1999 Kids Count Data Online, includes the following indicators of trends, over the ten-year period 1985 to 1996.

Indicators of poverty problems	1985	1996	
Percent of children in poverty	21%	20%	
Percent of children in extreme poverty			
(income below 50% of poverty level)	NA	9%	
Percent of children living with parents who			
do not have full-time, year-round employment	33%	30%	
Percent of families with children headed			
by a single parent	22%	27%	
Percent of female-headed families receiving			
child support or alimony	NA	34%	
Percent of teens not attending school			
and not working (ages 16-19)	11%	9%	
Percent of teens who are high school drop-outs			
(ages 16-19)	11%	10%	
Teen birth rate			
(births per 1,000 females ages 15-17)	31	34	

Indicators of health problems		
Percent of children without health insurance, 1996	14%	14%
Percent of children covered by Medicaid or other		
public-sector health insurance	NA	25%
Rate of top three causes of death in teens:		
accident, homicide, and suicide		
(deaths per 100,000 teens ages 15-19)	63	62

Indicators of education problems Percent of 4th grade students who scored below basic reading level 39% (1998) Percent of 8th grade students who scored below basic reading level 28% (1998)

Indicators of high risk groups

Children living in families with four or more of the following characteristics are considered at "high risk": child is not living with two parents; household head is high school drop-out; family income is below the poverty line; child is living with parent(s) who do not have steady, full-time employment; family is receiving welfare benefits; child does not have health insurance.

Percent of all children living in "high-risk" families, 1996	14%	
Percent of black children, 1996	30%	
Percent of Hispanic children, 1996	25%	
Percent of white children, 1996	6%	
Location with highest percent of children in "high risk"—		
District of Columbia, 1996	39%	
Location with least number of children in "high risk"—		
Utah, 1996	5%	

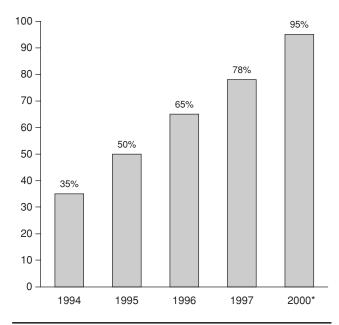
Source: The Annie E. Casey Foundation, 1999 Kids Count Data Online.

² Excludes schools with no computers

FIGURE 4

Rise in number of public schools with Internet access, 1994-97

(percent of schools with access)



*schools intending to have access Source: U.S. Statistical Abstract, 1998.

6.3 as of 1998.

Anyone who has worked in a "modern" classroom in recent years will notice one thing immediately: The kids are hooked on computers, almost like drugs. They are the biggest, and in some cases, the only attraction in the room. Give them "free" time and nobody wants to draw or paint or read. "May I get on the computer?" is the universal cry. But it's not for learning that the computers are attractive. It's for the video games and the "information." (The relative ease with which pornography can be accessed is another problem, beyond the purview of this article.)

This is not to dismiss or diminish the usefulness of computers and the revolution which the Internet has brought about. But to mistake the use of this *tool* of learning for learning itself, as Gore repeatedly does in his campaign statements, is to believe, as Gore and his backers do, that the human mind is, in essence, a sophisticated computer. As Lyndon LaRouche has repeatedly emphasized, true knowledge is the result of non-linear, creative thought, something which neither a computer nor Al Gore is capable of doing.

As to the Wall Street source for Gore's Information Superhighway hype, see the accompanying box on super-hedge fund operator D.E. Shaw.

There is a third false approach, though still minor in size, to solving the education crisis. In two largely African-American cities—Compton, California and Detroit, Michigan—the

state government has seized control of the district schools and is running them over the head of the elected school boards. In contrast to the school takeovers of the 1960s and '70s, when the Federal government took control of white-only schools to force integration, these takeovers are being run under cover of redressing academic failure, but actually aim at dis-empowering the black parents in the district.

As Michigan State Rep. Ed Vaughn (D-Detroit), who led the failed fight to stop the takeover in Detroit, told *EIR* (see March 5, 1999 issue), "We believe that the takeover is about money and it's about race." He charged that the takeover would be "a backdoor route to privatizing the school system."

In Compton, the district has been under state control for six years and a bill to return it to the district's control failed this year. Newton Prothro, publisher of the *Compton Business Journal* and a leader in the fight, protested in an interview with *EIR* that the state is now trying to sell off school property worth an estimated \$60 million, without submitting the sale for the required bidding, while at the same time demanding that the school district pay its debts to the state without benefit of those properties.

3. What is the solution?

LaRouche's 1997 *The LaRouche Program To Save the Nation*, points to two preconditions for rebuilding America's public education system: 1) a winning war on drugs; 2) an emergency program for national economic recovery. Both of these preconditions require the successful defeat of the British-American-Commonwealth cabal's hold over the United States and the establishment of a New Bretton Woods world monetary system.

As we said above, Washington and Franklin had to make a revolution against the British to get their school reforms implemented. There is no shortcut.

At the same time, LaRouche insists on the introduction of a Classical curriculum in all public schools. This curriculum trained the geniuses of Renaissance Europe and the outstanding leaders among our Founding Fathers. It includes Classical language, literature, poetry, and history, in English and foreign languages as well; and, learning by reproducing in the child's own mind the great inventions of human history.

Benjamin Franklin alluded to this curriculum in his 1749 *Proposal Relating to the Education of Youth In Pennsylvania*. Franklin wrote that the curriculum for the public schools should include study of the Greek and Latin languages, proficiency in the use of English, history, and natural science. His closing summation epitomized the Classical approach to the training of the mind of the future citizen: "The Idea of what is *true Merit*, should also be often presented to Youth, explain'd and impress'd on their Minds, as consisting in an *Inclination* join'd with an *Ability* to serve Mankind, one's Country, Friends and Family; which *Ability* is (with the Blessing of God) to be acquir'd or greatly encreas'd by *true Learning*; and should indeed be the great *Aim* and *End* of all Learning."

The curriculum reform that was enacted in the Prussia of Friedrich Schiller's time, a half-century after Franklin's proposal, by Minister of Education Wilhelm von Humboldt, Schiller's close friend and collaborator, was based on the same Classical model. It was that reform which created in Germany generations of gifted students in all fields of knowledge, from music to science—including the German scientists who fled Nazi Germany to comprise the core of America's successful space program—and has served as a model since that time.

LaRouche has detailed his ideas for reform of America's education system, based on the Classical model, in many locations in recent years. Because the full treatment of LaRouche's proposals is not within the scope of this article, we refer the reader to two crucial sources: The *EIR Special Report*, "The Libertarian Conspiracy To Destroy America's Schools" (April 30, 1986); and FDR-PAC's book, *The LaRouche Program To Save the Nation*, especially Chapter 7: Restore Literacy and Classical Education (1997).

The shortest way to achieving this necessary reform, of course, is to elect LaRouche President of the United States. The revolution required to do this is precisely that which our Founding Fathers left uncompleted for us to do.

Interview: William H. McCann, Jr.

Mr. McCann is a former Assistant Whip of the New Hampshire State Legislature (D-Dover), President of Chapter 41 of the Service Employees (SEIU) Local 1984, and a board member of the New Hampshire SEIU. He was interviewed on May 17 by Marianna Wertz.

EIR: What is the status of the school funding crisis, now that the May 15 deadline to come up with full funding has passed? McCann: The legislature tried to resolve the crisis, and they're now admitting that they are probably \$100 million short. With the compromise that was struck ten days ago, on paper it will fund an "adequate" education to the tune of \$4,200 per pupil in the state. When you get through figuring it out, there's an increase in the real estate transfer tax, there's a statewide property tax, there's an increase in business taxes. When all is said and done, the best estimate is that it probably raises \$725 million and spends \$825 million. So, now they're trying to figure out how to make that balance.

EIR: So at this point there's no prospect for immediate

'Virtual reality' plagues computer-dependent students

Civil engineer and historian Henry Petroski, who chairs the Department of Civil and Environmental Engineering at Duke University, identifies the displacement of mechanical play by virtual reality as a leading problem in engineering education today.

Writing in the May-June American Scientist, Petroski says: "So many students majoring in engineering today seem to have few if any experiences with the artifacts of engineering, other than consuming and using them. For example, some students may have significant expertise with regard to interfacing with a computer and may even engage in a degree of programming and hacking, but the vast majority appear to use the computer as a black box. They seem disinclined to open up the box to see what makes it tick. Neither are they drawn to fix their own cars, let alone their own bicycles.

"Indeed, judging from my own experiences with today's affluent first- and second-year engineering students, many of them appear to have led deprived childhoods when it comes to having learned the innards of machines by taking them apart and putting them together again. Moreover, not a few engineering students seem not to have even handled some of the most basic tools with which to do so. Because they have not had the tactile experience of being mechanics, they also seem to lack the visual sense that develops from it. Thus, when asked to draw a machine part, they are at a loss for lines."

Petroski discusses how the roots of the problem lie in part in the nature of toys. Formerly, budding engineers wrestled with the nuts and bolts of Erector sets, while today's engineers play electronic games. "One begins to wonder what these children of cyberspace will do when they encounter the real world of engineering, which does not come with prepackaged software or with everything preprogrammed," he writes.

Petroski concludes: "Because these concerns are widespread, at least among my generation, some engineering educators are coming to assume that virtually all incoming students are deficient in real tactile, spatial, and mechanical experiences. Thus, what might be called remedial play courses have been developed. One such course is taught at Stanford University under the title Mechanical Dissection. In it, students disassemble and then reassemble such machines and devices as laser printers, fishing reels, and tenspeed bicycles. The hands-on experiences are intended to provide a feel for engineering that a generation or two ago students would have brought with them to the classroom. It remains to be seen if such remedial activity will produce as many engineers who become business leaders as did my generation's untrammeled use of chemistry sets and construction toys."—Marjorie Mazel Hecht