First, I would like to congratulate the Committee on Technological Literacy, the National Academy of Engineering, and the National Research Council on a compelling report that really emphasizes the need for better technology education in our country. I'd also like to express my gratitude to the National Science Foundation and Bastille Memorial Institute for sponsoring this important work.

I am honored to speak here today on a subject that is close to my heart. As you probably know, I received my education in physics; however, through my career, I have worked as a college professor, a research scientist in alternative energy, an arms control expert at the State Department, and now as a Member of the United States House of Representatives. As you can imagine, in these different careers, I have observed a vast range of technological literacy. Today, though, I'd like to focus on my observations of technological literacy as a Member of Congress and how these observations relate to the Committee on Technological Literacy’s report.

I am one of two physicists in Congress. I am one of 24 Members of the 107th Congress who have backgrounds in medicine, science, or engineering. Given the number of issues that the legislative branch faces that involve technology, I would say that these numbers are low. On a daily basis, Congress must deal with a multitude of issues that have a basis in technology, such as
broadband regulation, human cloning, and energy policy. Since the tragic events of September 11, the number of technological issues that government must face has been amplified. Security is a topic that is laden with technology. How can we assess the likelihood of chemical, biological, and nuclear attacks? How do we make buildings less vulnerable to terrorist assaults? How do we protect our information infrastructure from cyberterrorism? What are the costs and benefits of a national identification card? How do we improve airport security? How can we improve our telecommunications network to make it more responsive to our needs in the event of an emergency? How do we prevent a biological attack via the mail? How do we decontaminate large buildings, equipment, and other items that become contaminated with anthrax or another biological or chemical agents? How does the legislative branch, made up of members who lack technological backgrounds, effectively answer these questions?

Right now, I would suggest that we don’t effectively answer these kinds of questions. Congress, as a whole, lacks the technological literacy to assess the technologies that are crucial for our national security. This wouldn’t be so discouraging if members of Congress could rely on staffers with technological backgrounds to advise them on issues involving science and technology. Unfortunately, this is not the case. The majority of Hill staffers are probably no more technologically literate than their bosses. The legislative assistant who handles science and technology issues most likely handles ten other issue areas ranging from foreign affairs to taxes.
The Congressional Research Service and the General Accounting Office have mandates to provide Congress with the information that it needs to function effectively. The Congressional Research Service provides Congress with rapid legislative information. The General Accounting Office evaluates ongoing government programs. Neither the Congressional Research Service nor the General Accounting Office is equipped to think critically about technology. This is the kind of technology assessment that Congress is lacking. Yet this is the kind of technology assessment to which Congress used to have access.

The Office of Technology Assessment, or OTA, was established in 1972 to provide Congress with unbiased technological analysis. The OTA staff consisted of about 150 people, more than half of whom held higher degrees in science and engineering. In 1995, however, OTA fell victim to budget cuts and closed its doors for good. Through its 23-year tenure, OTA published hundreds of reports on a variety of issues, such as the use of drugs in livestock feed, alternative fuels, and missile defense. In these reports, OTA critically analyzed technologies in terms of risks, benefits, tradeoffs, and costs. Congress could benefit from such technological assessment once again. For this reason, I have introduced a bill to reestablish the Office of Technology Assessment. Sixty-one representatives have cosponsored H.R. 2148, and we continue to garner support. I hope to be able to announce to you later this year that the Office of Technology Assessment will soon reopen its doors.

While the Office of Technology Assessment would provide Congress with very detailed technical analysis, it does not really present an efficient mechanism
for improving the technological literacy of the average congressman and staffer.

The Committee on Technological Literacy in its report recommends that:

Federal and state government agencies with a role in guiding or supporting the national scientific and technological enterprise, and private foundations concerned about good governance, should support the development of executive education programs intended to increase the technological literacy of leaders in government and industry.

The Committee has recommended a variety of education programs that would help to increase the technological literacy of the general public, both adults and children, and I wholeheartedly agree with these recommendations. The inclusion of policy makers in this education plan is not an obvious element, but nonetheless a crucial one. Giving government leaders and their staff a series of courses in technology will not only result in better policy but will also help attain the Committee’s goal of improving the technological literacy of the general public.

Policy makers can help educate the public by bringing important technological issues into the spotlight.

The Committee also recommends that, “U.S. engineering societies should underwrite the costs of establishing government-fellow and media-fellow programs with the goal of developing a cadre of policy experts and journalists with a background in engineering.” As an alumnus of the American Association for the Advancement of Science’s Congressional Science Fellowship program and as a congressman who has mentored Congressional Science Fellows, I cannot emphasize enough how valuable government-fellow programs are to the policymaking community. The science fellows fill a role that is vacant in most offices; if you’re looking for a staff member who really knows something about
science and can deal with technological subjects, this is one of the few places where you can look to get that expertise. Furthermore, a substantial number of these fellows stay in the government sector, thereby increasing the technologically literate population in the policymaking community. The number of fellows is limited, though; there are fewer than 40 congressional science fellows each year, and less than a fifth of those have engineering backgrounds. Expanding this program by encouraging more professional societies, especially the engineering societies, to sponsor fellows would do a great service to the government, and to the public.

So far, I’ve focused on the idea of “technological literacy for policy”, or how we can make policymakers more technologically literate. Before I close, I’d like to address the idea of “policy for technological literacy”, or what policymakers can do to improve technological literacy. I commend the Committee on Technological Literacy for calling to our attention the lack of congressional activity on this topic.

One of my main legislative goals, as an educator, has been to improve the state of science and mathematics education. Otherwise, where are all of our future scientists and engineers going to be found? Recent statistics show that our colleges and universities are continuing to experience a decline in graduates with technical degrees. We must reach back into the classroom of our elementary schools, middle schools, and high schools to inspire and nurture young, aspiring scientists and engineers. How will that be done?
It can be accomplished through a new, major national effort to improve science and mathematics education. Not only do we need to continually update and improve our curricula, we must recruit and retain better science and math teachers and we must promote diversity in these disciplines. Teachers should be valued in our society for the vital role that they play in the lives of our children by being paid a reasonable salary. Our communities must provide them with the resources they need.

While we can all agree with the need to invest in science education in theory, in practice we are not doing as well as we should. Just before adjourning the first session of the 107th Congress, appropriators determined what will be spent to carry out the “No Child Left Behind” education package agreed to by President Bush, the House of Representatives and the Senate. For most education programs, the dollar figures match what’s already been approved after almost a year of negotiations.

The one glaring exception comes in math and science education. No Child Left Behind calls for $450 million to be spent on math and science professional development. By way of comparison, the National Commission on Mathematics and Science Teaching for the 21st Century on which I served estimated the cost of a serious effort to improve math and science education at $5 billion. The $450 million included in No Child Left Behind struck us as barely a reasonable starting point.

However, the appropriations bill that funds the Department of Education includes only $12.5 million for these critical subjects. Across hundreds of
thousands of classrooms, that amount will hardly create a ripple of change, let alone the revolution organizations like yours are advocating in this area. That paltry amount works out to less than $100 for every public secondary school science teacher in the country. Congressman Vern Ehlers and I worked to try to mitigate this oversight with limited success.

In light of this report, it now seems only logical to expand this goal of improving science and math education to include technology education. We are surrounded by technology in our everyday lives; we need to ensure that the education that our children receive gives them an appreciation of technology, its history, and how it is developed. Americans must also learn to think critically about new technologies and how they will affect society. The Committee on Technological Literacy’s recommendations for technology education appear to be valid ones that are worthy of congressional attention.

Among the important concepts reported by the Committee for Technology Literacy is that we don’t really understand how people learn technology; therefore we don’t really understand what teaching methods are most effective in conveying technological concepts. This needs to change. As many of you are probably aware, Project 2061 is an initiative founded by AAAS in 1985 to improve literacy in science, mathematics, and technology. In 1999, the NSF funded a Project 2061 conference to discuss the directions of technology education, including setting a research agenda for technology education. Since then, the NSF has started the ROLE program, Research on Learning and Education. While this program doesn’t focus solely on technology education, it funds
research on science, technology, engineering, and mathematics education at the level of over $40 million in 2001. This is a good start.

I know that I will be taking a closer look at all of these recommendations as we enter this next session of Congress and I hope that my colleagues will do the same. Good legislation can guarantee that these recommendations become a reality and that we evolve into a more technologically literate society.