Toward A New Golden Age In American Education

HOW THE INTERNET, THE LAW AND TODAY'S STUDENTS ARE REVOLUTIONIZING EXPECTATIONS

National Education Technology Plan 2004
U.S. DEPARTMENT OF EDUCATION

U.S. Department of Education
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January 2005

Dear Members of Congress:

As required by the *No Child Left Behind Act of 2001*, I am pleased to submit our vision and recommendations for a National Education Technology Plan.

This report is based on thoughtful input we have received from literally thousands of students, educators, administrators, technology experts and officials of numerous educational organizations. It also builds on the recommendations submitted to you by Secretary Richard W. Riley in 1996 and 2000.

As you may recall from previous statements I have made on this issue, our schools have generally trailed other areas of our society in exploring the many opportunities offered by technology. Too often, schools have simply applied technology to existing ways of teaching and learning, with marginal results in student achievement. I am pleased to report that this is now changing quite significantly.

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Teachers and students are transforming what can be done in schools by using technology to access primary sources, expose our students to a variety of perspectives, and enhance the overall learning experience through multimedia, simulations and interactive software.

At the same time, teachers, principals and administrators are able to better track student achievement and adjust instruction more effectively to individual needs.

As detailed in this report, we are already seeing some remarkable results, driven by better use of existing technology and, to an important extent, by the bipartisan *No Child Left Behind Act*, which asks all of us to raise expectations and produce results. There is a new fervor in American education, a new creativity – driven in part by this generation of tech-savvy students – which I believe bodes well for the future of our country.

I thank you for your continued interest and support in the vital task before us. I believe you will find this report both interesting and encouraging. As always, I look forward to continuing to work with you to turn multiple opportunities for success into reality for our nation's nearly 50 million students.

Sincerely,

Rod Paige
Secretary, U.S. Department of Education

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Executive Summary

Over the next decade, the United States will face ever increasing competition in the global economy.

To an overwhelming extent, this competition will involve the mastery and application of new technologies in virtually every field of human endeavor. It will place particular emphasis on the need for heightened skills in mathematics and science.

It is the responsibility of this nation's educational enterprise – including policymakers – to help secure our economic future by ensuring that our young people are adequately prepared to meet these challenges. Today, they are not. This report explores why – and recommends steps to ensure that they will be.

We have clearly reached a turning point. All over this country, we see evidence of a new excitement in education, a new determination, a hunger for change. The technology that has so dramatically changed the world outside our schools is now changing the learning and teaching environment within them. Sometimes this is driven by the students themselves, born and comfortable in the age of the Internet.

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There has been explosive growth in the availability of online instruction and virtual schools, complementing traditional instruction with high quality courses tailored to the needs of individual students. Tests now can be taken online, giving students, teachers and parents almost instant feedback. This is a major step forward in tracking progress and identifying needs. New student data management systems will greatly facilitate the collection and use of test, demographic and other data for more effectively designing and managing instructional programs.

Examples cited in this report illustrate not only the changes now taking place in the nation's school systems, but the often dramatic improvements that we are beginning to see in student achievement. The new testing, reporting and accountability requirements of the *No Child Left Behind Act* are accelerating this trend. From being a Nation at Risk we might now be more accurately described as a Nation on the Move.

As these encouraging trends develop and expand over the next decade, facilitated and supported by our ongoing investment in

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educational technology, and led by the drive, imagination and dedication of a reenergized educational community at every level, we may be well on our way to a new golden age in American education.

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A Nation on the Move

Twenty-one years ago, the U.S. Department of Education's National Commission on Excellence in Education published the landmark report, *A Nation at Risk.* It warned that "the educational foundations of our society are being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people."[2]

It made the case that students are not being challenged with high quality mathematics and science curricula and many students are not learning the basic skills. A majority of our secondary school students still are not grade-level proficient in reading, mathematics or science. The data for minority students remain alarming.[3]

But change is in the air. Clearly, we must innovate for our country to succeed in this time of rapidly increasing global competition. This innovation is occurring. We see dramatic changes taking place in the educational landscape – a new excitement in the vast possibilities of the digital age for changing how we learn, how we teach, and how the various segments of our educational system fit together – a ferment for reform that is bringing changes undreamt of even five years ago and unparalleled in our nation's history.

> *"The people of the United States need to know that individuals in our society who do not possess the levels of skill, literacy and training essential to this new era will be effectively disenfranchised, not simply from the material rewards that accompany competent performance, but also from the chance to participate fully in our national life."*
>
> *A Nation at Risk, 1983*[1]

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With one notable exception, *No Child Left Behind*, these changes are being driven by forces in the field. They are being driven by the new realities of the digital marketplace, the rapid development of "virtual" schools, and the enthusiasm of an amazing generation of students weaned on the marvels of technology who are literally forcing our schools to adapt and change in ways never before imagined. As one high schooler put it, "we have technology in our blood."[4]

In education, this is a nation on the move and the pace is accelerating. Without seeking to overlook the very real challenges that remain, we feel the present evidence suggests strongly that we may be entering a new golden age in American education.

Improvements Will Be Dramatic

This report was undertaken by the staff of the U.S. Department of Education in response to a request from Congress for an update on the status of educational technology. As the field work progressed, it became obvious that while the development of educational technology was thriving, its application in our schools often was not. Over the past 10 years, 99 percent of our schools have been connected to the Internet with a 5:1 student to computer ratio.[5]

Yet, we have not realized the promise of technology in education. Essentially, providing the hardware without adequate training in its use – and in its endless possibilities for enriching the learning experience – meant that the great promise of Internet technology was frequently unrealized. Computers, instead of transforming education, were often shunted to a "computer room," where they were little used and poorly maintained. Students mastered the wonders of the Internet at home, not in school.[6]

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Today's students, of almost any age, are far ahead of their teachers in computer literacy. They prefer to access subject information on the Internet, where it is more abundant, more accessible and more up-to-date.[7]

Progressive teachers, principals and superintendents understand this. As examples cited in this report demonstrate, they have successfully adapted the endless opportunities presented by computer technology and married them in creative and challenging ways to the high-level technical capabilities and motivation of their students. Students and teachers become partners in the exploration of this new universe.

Thus students, teachers and technology are driving a return to educational excellence. But complementing these is what will surely be seen as the single most important driver of educational progress in the coming decade: the *No Child Left Behind Act*, passed in Congress in 2001 with strong bipartisan support. This seminal legislation with its 2014 deadlines is breathtaking in its scope and poses powerful goals to the education community. Within 10 years it aims to abolish illiteracy and bring millions of children currently "lost" to the educational system into the mainstream of learning and achievement. It is comparable in many ways to this country's 1960s quest to put a man on the moon. Combined with the increased use of new technologies and the motivated expertise of today's students, it means that 10 years from now we could be looking at the greatest leap forward in achievement in the history of education. By any measure, the improvements will be dramatic.

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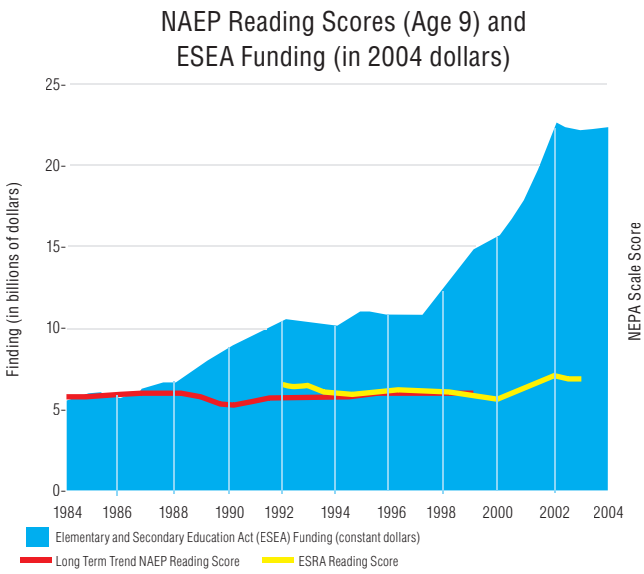
Where We Are Today

Why do we need systemic change? It is important to understand the national crisis that underscores the demand for accountability in education.

Today, the United States spends more money on education than any other nation except Switzerland, averaging more than $8700 per student (federal, state and local) in constant dollars for elementary and secondary education.[8]



Over the past 20 years, America has invested hundreds of billions of dollars in education. For the 2003-04 school year alone, expenditures at local, state and federal levels on elementary and secondary education exceeded $500 billion.[9]

Despite this investment, the National Assessment of Educational Progress (NAEP) reading scores have remained essentially flat during the same 20-year period, with 31 percent of our nation's 4th graders scoring at or above proficient on the assessment.[10]

The *No Child Left Behind Act of 2001* is beginning to reverse the trend as the nation rises to the historic challenges of access and quality set forth by both *Brown v. Board of Education* and "*A Nation at Risk.*"

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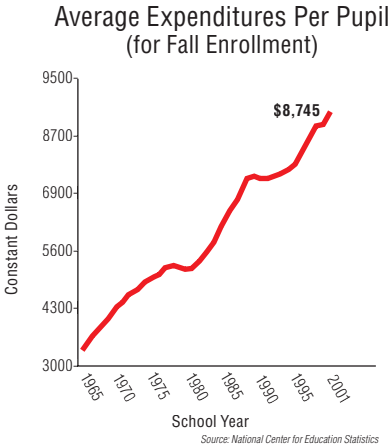
No Child Left Behind created new standards of accountability. Students have to demonstrate improvement over time and be proficient in reading and mathematics. Importantly, achievement gaps between different socio-economic backgrounds must be identified – and closed – so that all children regardless of race and income level can read and do mathematics at grade levels by 2014. This single piece of legislation has fundamentally altered the education landscape. Its premise – that all children can learn – is profound in its simplicity but multifaceted in its implementation.

President Bush's FY2005 budget for education represents continuing increases of federal education spending to historic levels with a 49 percent increase (from FY 2001-2005) for elementary and secondary education, including but not limited to:[11]

- $13.3 billion in Title I funding for disadvantaged students, for a total that represents a 52 percent increase since FY 2001.
- $1.2 billion for reading programs, totaling four times the amount spent in 2001.
- $11.1 billion for special education programs, for a 75 percent increase since 2001.[12]



No Child Left Behind's four main principles are:

- Holding schools accountable to show students are learning;
- Increasing flexibility for schools in reaching goals;
- Providing more options for parents to choose outside of low-performing schools;
- Using research on what works best for student learning.

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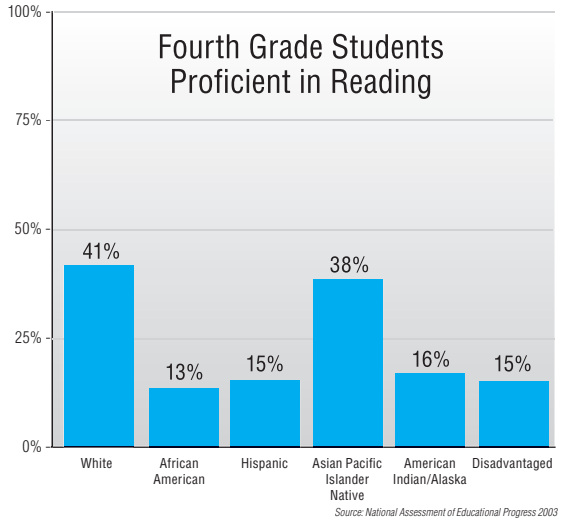

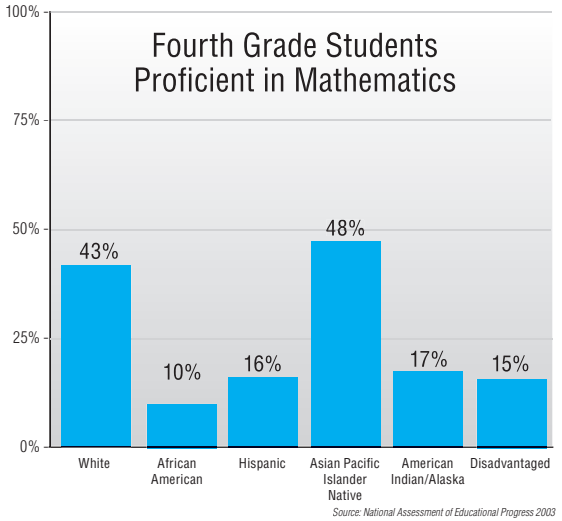

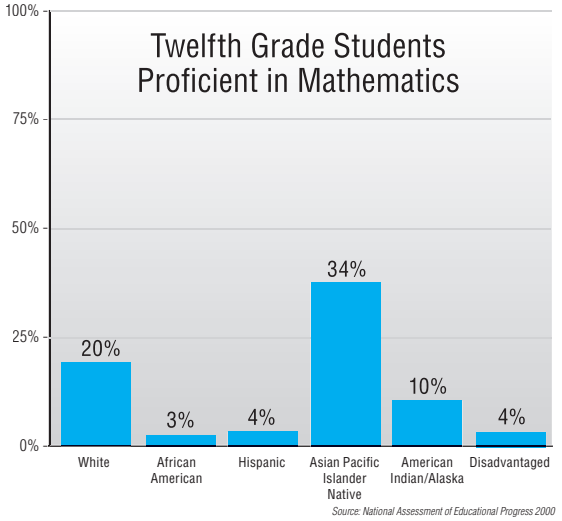

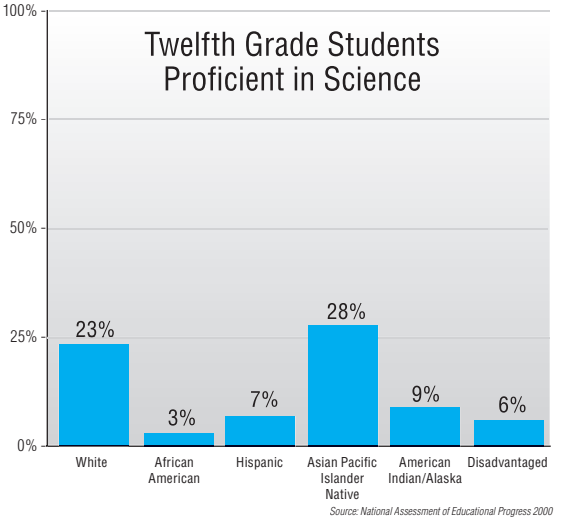

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Twenty years of national data show gaps in achievement despite spending increases, reflecting low expectations of performance, especially along the lines of racial and ethnic groups. Never before have we held schools accountable for how different demographic groups are achieving compared to peers in the same schools. For 4th grade reading, only 41 percent of Whites and 38 percent of Asians are proficient readers. Racial and ethnic breakdowns of which students can read show that only 13 percent of African Americans, 15 percent of Hispanics and 16 percent of Native Americans are proficient in reading at their grade level.

The numbers are truly disturbing. Put another way, more than 85 percent of African Americans, Hispanics and Native Americans are not proficient in reading in the 4th grade, according to data from NAEP.[13] The numbers are similar in mathematics with 90 percent of African American students not proficient in mathematics in the 4th grade.[14] This highlights the importance of using data to understand and inform how we make decisions.

The trend of low expectations compounds as students are passed along to the next grade level. By 12th grade, only 3 percent of African Americans are proficient in mathematics, only 4 percent of Hispanics, 10 percent of Native Americans, 20 percent of Whites and 34 percent of Asian Americans. Few students have competence in science or mathematics.[15]

We must not choose who succeeds. We must ensure that all students are expected to learn in schools.

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Who Are Our Students?

America's students are our ultimate constituents. We need to listen to them. They have demonstrated that they have a better understanding of the intricacies and opportunities presented by the technological revolution than many of their elders, notably including a generation of teachers and administrators who did not have the advantage of growing up with the Internet.

The nearly 50 million students in our elementary, middle and high schools today represent the largest and most diverse student body in our history.[16] Thirty percent are minorities, meaning that our school population is more diverse than this country's adult population.[17]

A number of studies, confirmed by field research and feedback from students – including nearly a quarter of a million students providing input to the U.S. Department of Education – portray a capable, conscientious, concerned and optimistic generation, determined to succeed. We have data collected from a variety of sources to help create a portrait of today's students. The data will surprise you – it is representative of all groups. As one student put it, "We're the kids who are going to change things."[18]

Following are some recent statistics which help to define this generation of students (sometimes referred to as the Millennial generation, or "The Millennials"):[19]

- 96 percent say that doing well in school is important to their lives.[20]
- 94 percent say they plan to continue their education after high school.[21]
- 88 percent say going to college is critical.[22]

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- 49 percent say they may be interested in pursuing a career in technology, 47 percent in business, 41 percent in medicine, 35 percent in law, 34 percent in entertainment and 33 percent in teaching.[23]
- 74 percent say they get along with their parents extremely well or very well.[24]
- 70 percent participate in community service or volunteer work.[25]
- 76 percent want to learn more about the world.[26]
- 28 percent of high school students access foreign news sources via the Internet.[27]
- 90 percent of children between ages 5 and 17 use computers.[28]
- Teens spend more time online using the Internet than watching television.[29]
- 94 percent of online teens use the Internet for school-related research.[30]
- 24 percent have created their own web pages.[31]
- 16 percent of teens are shareholders in the stock market.[32]
- Teens and college students combined spend nearly $400 billion a year.[33]

Today's Students

- *96 percent say that doing well in school is important to their lives.*
- *88 percent say going to college is critical.*
- *70 percent participate in community service or volunteer work.*
- *28 percent of high school students access foreign news sources via the Internet.*
- *90 percent of children between ages 5 and 17 use computers.*
- *94 percent of online teens use the Internet for school-related research.*
- *Teens and college students combined spend nearly $400 billion a year.*

Millennials' use of information and communications technology reaches to the youngest ages. The largest group of new users of the Internet from 2000-2002 were 2-5 year olds.[34]

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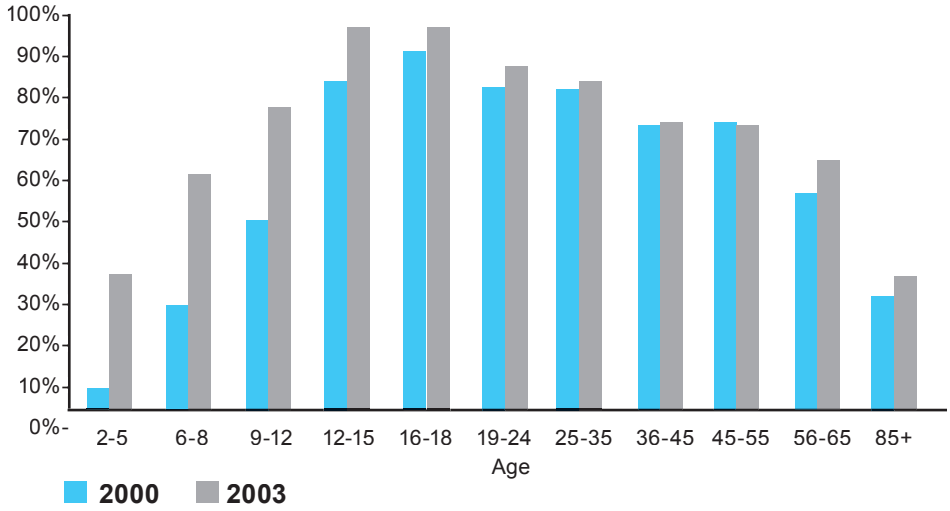
Internet Use by Age



Source: Cole, Jeffrey I., et al. UCLA Internet Report: Surveying the Digital Future, Year Three. *UCLA Center for Communication Policy. Feb. 2003;* Connected to the Future: A Report on Children's Internet Use. *Corporation for Public Broadcasting. 2002; Horrigan, John, et al.* The Ever-Shifting Internet Population. *Pew Internet & American Life Project. 16 Apr. 2003.*

The U.S. Department of Education's National Center for Education Statistics found that 72 percent of all first graders used a home computer on a weekly basis during the summer[35] and by 1999, 97 percent of kindergarteners had access to a computer at school or home.[36] Even students from low-income groups without access to technology at home seek and find it – using computers at schools, libraries or at friends' homes.

Millennials feel that education is important. Eighty-eight percent of students reported that attending college is critical or very important to success in later life; and 91 percent of today's students report having a teacher or administrator who personally cares about their success.[37]

These studies on the current generation of American students suggest a determined generation for whom the Internet appears to have stimulated interest in learning in general and, in particular, a revival of interest in researching and innovating using technology.

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These are clearly exciting times for both teachers and students. As expressed by one superintendent, "The future is now. Our children can't wait." [38]

What Are They Telling Us?

NetDay, a national nonprofit organization that promotes the effective use of technology in schools to enhance student achievement, enlisted 210,000 K-12 students representing schools in all 50 states, the District of Columbia, Puerto Rico, and on American military bases worldwide to go to http://www.netday.org over a ten-day period in October and November 2003, to complete an online survey as part of its first Speak Up Day for Students. In March 2004, these findings were issued in a national report partially funded by the U.S. Department of Education, entitled *Voices and Views of Today's Tech-Savvy Students,* to support the inclusion of students' perspectives in the development of the National Education Technology Plan.[39]

Major themes emerged from the students' comments:

- Today's students are very technology-savvy, feel strongly about the positive value of technology and rely upon technology as an essential and preferred component of every aspect of their lives.
- Students are not just using technology differently today but are approaching their lives and their daily activities differently because of the technology.
- As students get older, their use of technology becomes more sophisticated, but, comparatively, the younger students are on a fast track to becoming greater technology users and advocates.
- The access point for technology use, particularly for older students, is home-focused, not school-focused.
- Today's students are ultra-communicators.

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Student comments from the survey of grades 6-12:

"We would like to have one computer per student, possibly a wireless laptop. Software needs to be updated, as well as hardware. Infrastructure should be improved to accommodate these upgrades. Access is vital, with before and after school hours open for use."

"Hire people to keep the computers running, give us more bandwidth and less firewall, enable hookups from home, give the teachers more training and give us more computer classes. We're also interested in ITV and online classes."

"I would like them to let us kids sign laptops out of the library and there would be enough for everyone in the school. Or they could give us a laptop for the year."

"Students should be allowed to have free access to online tutoring."

Student comments from grades 3-6:

"I think that teachers should be required to go to a technology course and extra classes should be available to kids who need help working with computers, want to learn more about technology, or who just want to have fun."

"Teachers could show more videos and web sites to show kids more information in social studies and science."

"I think that students should have laptops to do everything in class. We can type our homework, schoolwork, copy notes and things

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like that. We should not have to carry heavy books all day long and bring all of our books home."

"I think that we (schools) could give technology classes to students and teachers because our teachers are falling behind the students, as they aren't good with computer programs and software."

"I think the teachers could use technology better by learning more about it. I think if they learn more about it they could help the students better and help them do projects and stories."

"I really think that we should go to computer lab more often so that we can learn more about the world around us and what's going on."

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Tear Down Those Walls: The Revolution Is Underway

Walls – both physical and philosophical – have held back new, more creative and more effective uses of the Internet in schools.

"Education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part, despite numerous reforms and increased investments in computers and networks."

Rod Paige
U.S. Secretary of Education

Virtually every public school has access to the Internet.[40] Yet in most schools, it is business as usual. Computers are enclosed in computer rooms rather than being a central part of the learning experience. Internet-savvy students are frustrated, as is well documented in the 2002 report, *The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and Their Schools.*[41]

The problem is not necessarily lack of funds, but lack of adequate training and lack of understanding of how computers can be used to enrich the learning experience. The good news is that things are changing. States, localities and schools are creatively using existing resources to restructure money within their existing budgets to align technology with improved learning. These examples show the benefits of realizing efficiencies and results through systemic improvement. Creative new teaching models are emerging – frequently in smaller districts – that embrace technology to redesign curricula and organizational structures. As the following examples from across the country demonstrate, the results in educational achievement often have been significant. The restrictive walls of the past are being torn down and a transformation in teaching is underway.

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Success Stories from Schools That Are Leading the Way

Alaska

In 1994, the Chugach School District (CSD) in south central Alaska was failing by almost all measures: staff turnover exceeded 50 percent; students scored lowest in the state on California Achievement Tests; business leaders complained that graduates lacked basic skills; and only one student in 26 years had graduated from college.

The school board and district leaders proposed radical changes. The district eliminated grade levels as measures of progress and adopted a standards-based system with levels of mastery that emphasize real-life learning situations. Each student has a learning plan based on his or her learning patterns and needs, and must demonstrate proficiency in 10 areas of performance.

Chugach uses technology to enhance student learning, to improve student technology skills, and to improve the efficiency of its academic and administrative operations. Overall student use of the Internet increased from 5 percent in 1998 to 93 percent in 2001.

Results have been dramatic. On the California Achievement Test reading scores rose from the 28th percentile in 1995 to the 71st percentile in 1999; mathematics scores increased from 54th to 78th; and language arts scores from 26th to 72nd. Fourteen CSD graduates are now attending post-secondary institutions. Annual faculty turnover has dropped from more than 50 percent to 12 percent.

Recently, the Chugach district led the formation of the Alaska Quality Schools Coalition and 12 districts are replicating its model. In 2001, the district was the smallest organization ever to receive the Malcolm Baldrige National Quality Award for performance excellence in education.[42]

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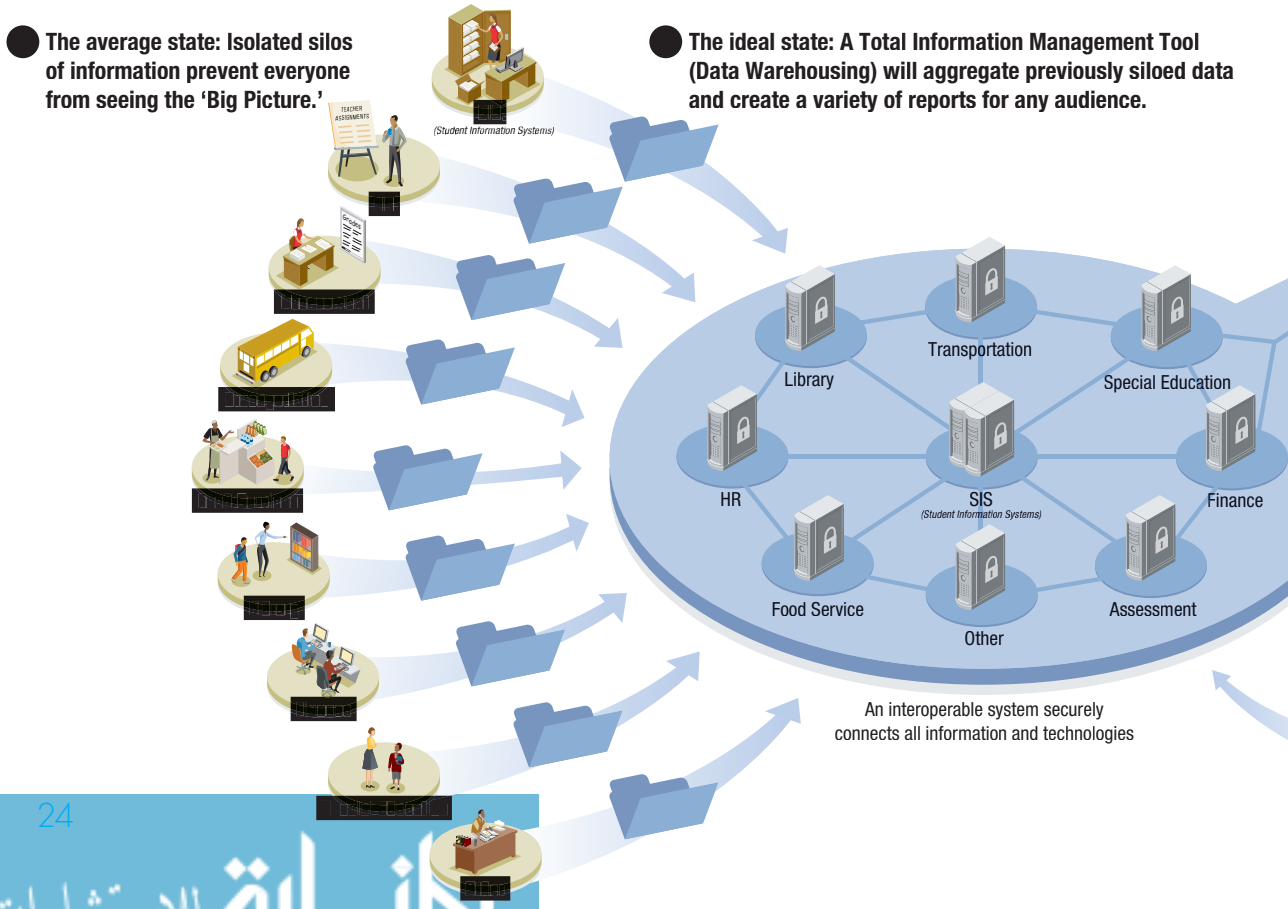
California

In the fall of 2002, Poway Unified School District in the suburbs of San Diego rolled out Total Information Management System (TIM), enabling teachers to log in to view a class and drill down to a student profile. The data warehouse pulls relevant data from the student information system, human resources, special education, student assessment, and delivers up-to-date, on-command information to the teacher. Teachers can filter by period, course or any of the *NCLB* filters such as ethnicity, gender, or second



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language learners to compare achievement and identify strengths and weaknesses. The profiles have current and historical data as well as contact information for the student and parents, and e-mail links to other teachers. With this tool, teachers can use the data to drive instructional practices – something that was not possible in the past.

Instructional Technology Specialist Stacey Campo trains teachers throughout the district to make effective use of this information and provides feedback to the information systems division. Charlie

The Result: These reports inform instruction, resulting in continuous student improvement.

Improving achievement through Student Data Management

On average, there is little aggregation of student data in today's school systems. Information is siloed, redundant and difficult to share. The technologies used — if any — are aging and frequently incompatible. An ideal state has complete aggregation and alignment. It is easier to ensure that students meet challenging standards, teachers target instruction, parents know teachers are helping their children, school districts know how to allocate resources effectively and the government knows how schools are doing.

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Garten, who directs the information systems division, and project leader Tracy Jones involved teachers and students in each stage of development. TIM is helping all teachers apply differentiated instruction to improve learning for all of their students.[43]

High Tech High (HTH) in San Diego used a Bill and Melinda Gates Foundation grant and funding from the San Diego technology business community to start a charter school from scratch. Since its launch in September 2000, the school has been an innovation leader in using technology and grounding learning in the "real world." Student internships with area businesses are built into the schedule and students use technology to conduct biotechnology lab experiments, build robots and produce sophisticated school projects. Its 400 students are from diverse ethnic and economic backgrounds and last year 100 percent of HTH seniors were accepted into college. Under Principal and CEO Larry Rosenstock's leadership, technology and intellectual rigor are central to the educational experience at HTH – a learning experience in an environment which is open to the real world and fosters connections to the community.

The school's innovations include performance-based assessment, daily shared planning time for staff, state-of-the-art technical facilities for project-based learning, internships for all students, and close links to the high-tech workplace.

Florida

The Florida Virtual School, whose motto is "anytime, any place, any path, any pace," grew out of a $200,000 state-level "Break the Mold" grant. The threefold aim was to relieve the strain of overcrowded schools in the fast-growing Florida districts; to meet the demands for high-needs courses; and to make advanced courses available to students throughout the state's 32 rural districts.

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Founded in 1997, the state-funded institution serves 21,270 student enrollments and employs 150 full-time and part-time teachers. Experienced teachers monitor the progress of all students and are available to students by telephone or e-mail.

Ninety-seven percent of the school's students take only one or two courses to fill a need not met in their own schools. Minorities make up some 30 percent of enrollment. The students come from public schools (72 percent), home schooling (21 percent), and private or charter schools (7 percent). The majority of students are from Florida, but there are students from many other states and even as far away as Shanghai.

Missouri

Peabody Elementary School in St Louis is situated in an urban neighborhood marked by abandoned buildings and serves almost entirely Title I students from the lowest income families. Principal Myrtle Reed had high expectations and through online assessments and customized instruction over three years achieved remarkable improvement in students' scores on Missouri Assessment Program (MAP) standardized tests.

Reed selected the eMINTS program — enhancing Missouri's Instructional Networked Teaching Strategies — which provides 200 hours of professional development, coaching and technical support for teachers as they use multimedia tools to promote critical thinking and problem-solving techniques.

Peabody students take regular online assessments of their progress, allowing teachers to customize instruction to the specific needs of individual students. Teachers assign online reading instruction software and online tutoring programs based on individual student's level of mastery of the curriculum. Working on desktop computers, students proceed at their own pace.

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Using a technology-rich environment, instruction is personalized. Teachers and principals know exactly how students are doing on a daily basis.

The results have been dramatic. In 2001, only 7 percent of Peabody third graders could read at grade level. A year later, the number improved to 25 percent. In 2003, 80 percent of third graders were reading on grade level. Similar stunning results occurred in mathematics, science and social studies.

The success of the program was recognized by an $8.4 million grant from the U.S. Department of Education that will help create additional eMINTS training and technology in classrooms. The *St. Louis Post-Dispatch* commented that the turnabout at Peabody would have been remarkable for any school, but was particularly impressive "in a neighborhood where virtually every child is poor, a fact that too often translates into low expectations and rock-bottom test scores." The eMINTS program is now available to schools nationwide.

Virginia

Henrico County, a suburban and rural district with 43,000 students and 3,000 teachers in 64 schools, supplied every high school student their own laptop computer. In Spring 2001, all high school faculty received a laptop computer. In Fall 2002, all middle school students and elementary school teachers received laptops, and in Winter 2002, all middle school teachers received laptops. A primary goal of the initiative was to create an environment of engaged and active learning, rather than the simple didactic approach. Henrico County paid for this laptop program by repurposing existing funds, as well as using lease agreements. Currently, 28,000 laptops are deployed in Henrico County. What

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makes this effort extraordinary is that they have done this with $500 less than the state average annual per-pupil expenditure and $611 less than the national average.

In 1994, there were significant numbers of elementary schools that did not have a single computer lab, and the total technology deployment in the district was relatively sparse, consisting primarily of one or two computer labs per middle and high school. In 1998, 5 percent of students used the Internet; today *all* middle and high school students are online.

What is remarkable is what students can do with the technology, curricula and good instruction. They are accessing primary sources, exploring different perspectives on historical events, using geometry simulations in three dimensions to learn mathematics and increasing their interactions with teachers and other students online. Assessments are online and provide instant feedback. Art history courses take virtual field trips to art galleries worldwide.

Henrico offers all students the opportunity to take online courses through their laptops – advanced mathematics and science, foreign languages and other courses – as well as SAT test-prep courses. Individual Education Plans (IEPs) are online and save teachers time and effort while enabling updated information.

The success of this initiative would not have been possible without direct teacher training and support. Demonstrating their commitment to life-long learning, Henrico County Public Schools provides a $1,000 per year tuition reimbursement for eligible employees. Additional institutes were scheduled and taught by master teachers to ensure that the faculty received the training needed to successfully use technology as an instructional tool.

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Among the numerous awards Henrico has received: The U.S. Senate Award for Continuing Excellence and nine U.S. Department of Education Blue Ribbon School awards.[44]

State Initiatives[45]

Virginia

Virginia is one of the leading states in developing a model and implementing a statewide initiative for integrating data systems with statewide online assessments – a partnership between the Virginia legislature, the Virginia Department of Education and the Governor's office. The state created Virginia's Web-based Standards of Learning Initiative with the goal that all Virginia school divisions would use Web-based systems to improve the Standards of Learning instructional, remedial and testing capabilities of high, middle and elementary schools by 2009. Online delivery of results will be provided to state and local administrators for evaluation and planning. To date, Virginia has delivered 400,000 assessments online. Specific objectives of the initiative are to:

- Provide student access to computers at a ratio of one computer for every five students.
- Create Internet-ready local area network capability in every school.
- Assure adequate high-speed, high-bandwidth capability for instructional, remedial and testing needs.
- Establish a statewide Web-based Standards of Learning test delivery system.
- Deliver ongoing training to teachers and administrators.

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New Mexico

Two years ago in New Mexico, the then state education technology director was interested in using handheld devices for assessment. He approached the directors of the Reading First program and the assessment program and convinced them to enter into a reading initiative that allowed teachers across the state to assess their students' reading progress, to answer to the accountability required by the Reading First program and to provide a low-cost, highly motivating system for doing all of this. The results were many – technology was infused throughout New Mexico's schools, Reading First funding was shared with the office of education technology and data were available in a timely manner, allowing teachers to hone in on the skills that need reinforcement.

Louisiana

Louisiana's On-Line Professional Development is designed to provide professional development for teachers, administrators, and school personnel in K-12 school districts. The program includes graduate-level online courses, community of learners networks, and workshops for specific educational needs. Through a variety of experiences, it provides learning opportunities and resources to support all teachers in their efforts to improve student learning and achievement.

The impetus for the program was the need to provide professional development for educators that better suited their learning styles and their schedules. Initial efforts involved individuals from across different divisions of the state department of education (including professional development, curriculum, teacher standards, instructional technology and school nutrition) and outside experts.

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Idaho

The Idaho Student Information Management System or ISIMS Project creates a statewide, student information management system designed to provide new resources for parents, teachers, students and all stakeholders of education in Idaho. The ISIMS project is a partnership of the Governor and Legislature, State Board of Education, State Department of Education, J.A. & Kathryn Albertson Foundation and all school districts in Idaho.

In the 2003 legislative session, the Idaho legislature passed legislation requiring all school districts in Idaho to use the ISIMS system to the full extent of its availability. The J.A. & Kathryn Albertson Foundation dedicated $35 million to the development and implementation of the ISIMS system. The plan expands a $3.5 million pilot program now in place in 13 districts that allows the districts to collect, maintain and share student information among their schools. The project will build a centralized, uniform system that includes a host of web-based resources and tools for education stakeholders.

West Virginia

The West Virginia Virtual School (WVVS) was created by state senate legislation that became effective on July 1, 2000. It was created to offer high quality educational courses to students through Internet technology, regardless of school location or size. The West Virginia legislature passed the bill based on the following findings about virtual learning:

- West Virginia schools have improved and expanded Internet access, which enables schools to offer courses through the Internet, and other new and developing technologies.
- Current technology is available to provide students with more resources for learning, and new and developing technologies offer even more promise for expanded opportunities.

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- A number of other states and other jurisdictions have developed Internet-based instruction which is available currently and which is being used by schools in the state.
- To better educate the students of West Virginia, more course and class offerings can be made available through technology, especially to students who are geographically disadvantaged.

In the planning stages, educators from all 55 counties participated in a "Going the Distance-1999" week-long conference to identify and study the issues associated with Virtual Schools. The educators were charged to take online classes during the summer. This planning group then re-assembled and discussion centered on best practices to inform planning of the project. The legislation was drafted using the input from this process.

Arkansas

The state's Environmental and Spatial Technology Initiative (EAST) includes strong relationships between business, government and education. These relationships provide awareness and access to resources normally not available to educators. The EAST philosophy includes:

- Educational experiences that are relevant, challenging, purposeful, and student centered.
- An educational environment that includes state of the art, real-world tools and reflects a work-like setting.
- Educators that serve as resource guides, managers, and learner facilitators.
- Learning that is self-directed as much as possible and oriented towards real-world projects that engage students in independent as well as interdependent roles.
- High expectations for all students.

The EAST model has been recognized nationally as an innovative, relevant, and successful approach to education.

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Pennsylvania

The Pennsylvania Department of Education (PDE) has a regional technology program (eSPARC) that focuses on increasing in-home access to computers and the Internet, particularly for high-need families, in an effort to bridge the digital divide. Pennsylvania received a $1.8 million grant from the U.S. Department of Education to study the impact of computers on student achievement. The study will examine the benefits of home access for student learning and parental involvement. The evaluation will explore a wide range of research questions that focus on whether and how in-home computer and Internet access impact students and parents, allowing for the promotion of "what works". In addition, PDE will produce and disseminate resultant research methodologies and tools that will assist in measuring the impact of technology initiatives across program areas, strengthening local, state and national evaluative capabilities.

The Explosion in E-Learning and Virtual Schools

Over the past five years there has been an explosive growth in online and multimedia instruction (e-learning) and "virtual schools." At least 15 states now provide some form of virtual schooling to supplement regular classes or provide for special needs.[46] Hundreds of thousands of students are taking advantage of e-learning this school year.[47] About 25 percent of all K-12 public schools now offer some form of e-learning or virtual school instruction.[48] Within the next decade every state and most schools will be doing so.

E-learning and virtual schooling are essentially the same product: they provide individual online instruction. They are the 21st century version of distance-learning through correspondence

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courses by mail. But through today's technology they are more immediate and, for students, far more enriching. E-learning offers flexibility in the time, place, and pace of instruction. It provides teachers the opportunity to create an instructional environment that adapts to students wherever and however they need to learn, at home or in school. It gives parents a significant choice of providers and educators an alternative means of meeting their student's academic needs. In higher education, some 90 percent of four-year public institutions and more than half of four-year private institutions offer some form of online education.[49]

Virtual Schools are complete educational organizations that deliver courses primarily online. They may be run by state agencies (Florida, Illinois, West Virginia), regional agencies and consortia (Virtual High School in Massachusetts), universities (University of California), local public school districts (Houston Virtual School), and more than 80 schools (cyber-charter schools) that received a charter from a local district, state board or other sponsor.[50]

A good example of the impact of virtual schooling is the Florida Virtual School (FLVS). Founded in 1997, the FLVS is a national leader in providing online, distance education solutions for K-12 students. Most of its 13,000 students in the 2003-2004 school year enrolled for only 1 or 2 courses for a total of 21,270 course enrollments. In addition to designing and monitoring the online instruction, FLVS teachers communicate with students and parents on a regular basis by phone, e-mail, online chats, instant messaging and discussion forums. A full 90 percent of its enrollees complete and pass FLVS classes.

For most students, FLVS courses add to what is available in their local schools. An online GED preparation course, developed by FLVS, is available to working adults through The Florida Adult and Technical Distance Education Consortium. FLVS's 150

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certified instructors teach more than 80 courses delivered over the Internet to students from Florida, more than 30 other states and even foreign countries. Partnering with FLVS, rural or smaller school districts can offer a selection of Advanced Placement courses or language study for which they would not otherwise have the resources. As one teacher from a small, rural Florida district has noted: "Online learning 'evens the playing field' for rural students."

With more choices available, traditional schools are turning to distance education to expand offerings for students and increase professional development opportunities for teachers.

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The Impact of *No Child Left Behind*

No Child Left Behind, signed into law by President Bush in January 2002, is already having a major impact on public education. Its ambitious goals, to end the achievement gap between rich and poor and white and minority students and improve the academic performance of all students by 2014, are requiring states and school districts across the country to reexamine their standards, set targets for improvement, introduce rigorous testing, and give options to parents.

> *"We cannot assume that our schools will naturally drift toward using technology effectively. We must commit ourselves to staying the course and making the changes necessary to reach our goals of educating every child. These are ambitious goals, but they are goals worthy of a great nation such as ours. Together, we can use technology to ensure that no child is left behind."*
>
> *– President George W. Bush*

Although only three years old, NCLB is producing measurable results. Many states have reported significant gains in meeting Adequate Yearly Progress (AYP) goals for the 2003-2004 school year, according to data compiled by the Education Trust and the National Alliance of Black School Educators.[51] In nine states – North Carolina, Pennsylvania, Maryland, Kentucky, Alaska, Georgia, Virginia, West Virginia and California – the proportion of schools making AYP increased by at least 10 percentage points. Maryland led the nation with 86 percent of its public schools making AYP in reading and math scores – up 19 percent from the 2002-2003 school year.

While boosting the performance of all students, schools are reporting notably sharp gains for poor and minority children, particularly in the elementary grades.[52] For example, in Illinois from 2001 to 2004 the proportion of Latino fifth graders achieving

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proficiency on state math assessments increased dramatically to 76 percent from 41 percent three years earlier – and the gap with white students narrowed to 16 percentage points from the previous 35 point difference.

"Across America, school teachers did something this year that many of them didn't expect to do. They raised their students' math and reading scores. Although some states, such as Oregon and Nevada, saw little change or a drop in their scores, overall more states and school districts saw test results improve rather than decline. In Florida, 10 percent more fourth-graders got satisfactory marks on the state's math test than did so last year. In Arkansas, 14 percent more sixth-graders performed at grade level on reading and writing tests. In Chicago, the percentage of third- and fifth-graders passing tests rose by double digits. In a majority of the states that have released results under No Child Left Behind, fewer schools are failing to meet the law's goals. And because teachers are the most important factor in student achievement, they deserve at least some credit for that."

– National Journal (9/11/04)

In addition to the many indicators of tangible progress, the law is stimulating lively debate over how to re-think and redesign educational models to raise standards, retrain educators, reapportion budgets, exploit new technologies and provide students with the technological and individual support they need. As the Education Commission of the States (ECS) has noted, a number of states do not yet have the technology infrastructure they need.[53] But progress is being made.

The goals have been set and the work is underway. As ECS concludes in its 2004 Report to the Nation, "To many, NCLB embodies the nation's recognition of and commitment to two imperatives, one moral and the other economic; namely, that education is a civil right, and that a high-quality, high-performing education system is vital to maintaining America's competitiveness in the world economy."[54] It is a challenge that America can – and must – meet.

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A National Education Technology Plan: The Future Is Now

Seven Major Action Steps and Recommendations

> *"Our children can't wait. The future is now. We need to be preparing them for a future that few of us can even visualize."*
>
> *– Dr. Mark Edwards*
> *Former Superintendent*
> *Henrico County, VA*
> *Public Schools*

1. Strengthen Leadership

For public education to benefit from the rapidly evolving development of information and communication technology, leaders at every level – school, district and state – must not only supervise, but provide informed, creative and ultimately transformative leadership for systemic change.

Recommendations for states, districts and individual schools include:

- Invest in leadership development programs to develop a new generation of tech-savvy leaders at every level.
- Retool administrator education programs to provide training in technology decision making and organizational change.
- Develop partnerships between schools, higher education and the community.
- Encourage creative technology partnerships with the business community.
- Empower students' participation in the planning process.

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2. *Consider Innovative Budgeting*

Needed technology often can be funded successfully through innovative restructuring and reallocation of existing budgets to realize efficiencies and cost savings. The new focus begins with the educational objective and evaluates funding requests – for technology or other programs – in terms of how they support student learning. Today, every program in *No Child Left Behind* is an opportunity for technology funding – but the focus is on how the funding will help attain specific educational goals.

Funding and budgetary recommendations for states, schools and districts include:

- Determine the total costs for technology as a percentage of total spending.
- Consider a systemic restructuring of budgets to realize efficiencies, cost savings and reallocation. This can include reallocations in expenditures on textbooks, instructional supplies, space and computer labs.
- Consider leasing with 3-5 year refresh cycles.
- Create a technology innovation fund to carry funds over yearly budget cycles.

3. *Improve Teacher Training*

Teachers have more resources available through technology than ever before, but some have not received sufficient training in the

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effective use of technology to enhance learning. Teachers need access to research, examples and innovations as well as staff development to learn best practices. The U.S. Department of Education is currently funding research studies to evaluate the effective use of technology for teaching and learning. The National Science Foundation also provides major support for educational research.

Recommendations for states, districts and individual schools include:

- Improve the preparation of new teachers in the use of technology.
- Ensure that every teacher has the opportunity to take online learning courses.
- Improve the quality and consistency of teacher education through measurement, accountability and increased technology resources.
- Ensure that every teacher knows how to use data to personalize instruction. This is marked by the ability to interpret data to understand student progress and challenges, drive daily decisions and design instructional interventions to customize instruction for every student's unique needs.

4. Support E-Learning and Virtual Schools

In the past five years there has been significant growth in organized online instruction (e-learning) and "virtual" schools, making it possible for students at all levels to receive high

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quality supplemental or full courses of instruction personalized to their needs. Traditional schools are turning to these services to expand opportunities and choices for students and professional development for teachers.

Recommendations for states, districts and schools include:

- Provide every student access to e-learning.
- Enable every teacher to participate in e-learning training.
- Encourage the use of e-learning options to meet *No Child Left Behind* requirements for highly qualified teachers, supplemental services and parental choice.
- Explore creative ways to fund e-learning opportunities.
- Develop quality measures and accreditation standards for e-learning that mirror those required for course credit.

5. Encourage Broadband Access

Most public schools, colleges and universities now have access to high-speed, high-capacity broadband communications. However, broadband access 24 hours a day, seven days a week, 365 days a year could help teachers and students to realize the full potential of this technology and broadband technology needs to be properly maintained.

Recommendations to states, districts and schools include:

- Thoroughly evaluate existing technology infrastructure and access to broadband to determine current capacities and explore ways to ensure its reliability.

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- Encourage that broadband is available all the way to the end-user for data management, online and technology-based assessments, e-learning, and accessing high-quality digital content.

- Encourage the availability of adequate technical support to manage and maintain computer networks, maximize educational uptime and plan for future needs.

6. Move Toward Digital Content

A perennial problem for schools, teachers and students is that textbooks are increasingly expensive, quickly outdated and physically cumbersome. A move away from reliance on textbooks to the use of multimedia or online information (digital content) offers many advantages, including cost savings, increased efficiency, improved accessibility, and enhancing learning opportunities in a format that engages today's web-savvy students.

Recommendations to states and districts include:

- Ensure that teachers and students are adequately trained in the use of online content.

- Encourage ubiquitous access to computers and connectivity for each student.

- Consider the costs and benefits of online content, aligned with rigorous state academic standards, as part of a systemic approach to creating resources for students to customize learning to their individual needs.

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7. *Integrate Data Systems*

Integrated, interoperable data systems are the key to better allocation of resources, greater management efficiency, and online and technology-based assessments of student performance that empower educators to transform teaching and personalize instruction.

Recommendations to states, districts and schools include:

- Establish a plan to integrate data systems so that administrators and educators have the information they need to increase efficiency and improve student learning.
- Use data from both administrative and instructional systems to understand relationships between decisions, allocation of resources and student achievement.
- Ensure interoperability. For example, consider School Interoperability Framework (SIF) Compliance Certification as a requirement in all RFPs and purchasing decisions.
- Use assessment results to inform and differentiate instruction for every child.

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Conclusions

- There is no dispute over the need for America's students to have the knowledge and competence to compete in an increasingly technology-driven world economy.
- This need demands new models of education facilitated by educational technology.
- In the realm of technology, the educational community is playing catch-up. Industry is far ahead of education. And tech-savvy high school students often are far ahead of their teachers.
- This "digital disconnect" is a major cause of frustration among today's students.
- Public schools that do not adapt to the technology needs of students risk becoming increasingly irrelevant. Students will seek other options.
- Some of the most promising new educational approaches are being developed outside the traditional educational system, through e-learning and virtual schools.
- Reforms within the system will require strong leadership and a willingness to restructure the learning environment in fundamental ways.
- *No Child Left Behind* is a powerful catalyst for needed reform.

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- Today's technology-literate middle and high school students will also be drivers of reform, creating a new student-teacher partnership.

- The current ferment within the education community will lead to major changes in the way we teach, learn and manage public education.

- With the benefits of technology, highly trained teachers, a motivated student body and the requirements of *No Child Left Behind*, the next 10 years could see a spectacular rise in achievement – and may usher in a new golden age for American education.

- This is an exciting, creative and transforming era for students, teachers, administrators, policymakers and parents.

Systemic change is being shepherded through the efforts of dedicated teachers, administrators, parents and students. Technology ignites opportunities for learning, engages today's students as active learners and participants in decision-making on their own educational futures and prepares our nation for the demands of a global society in the 21st century.

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APPENDIX A

Joint Federal Activities Promoting the Use of Technology in Education

The U.S. Department of Education's (ED) Office of Educational Technology (OET) resides in the Office of the Secretary of Education. OET provides leadership to maximize technology's contribution to improving education. OET develops national educational technology policy and implements policy departmentwide supporting the goals of *No Child Left Behind*. OET helps to ensure that ED programs are coordinated with efforts across the federal government.

The most significant of the joint activities of the U.S. Department of Education and other federal government entities is the Administration's interagency working group to examine how America's technological leadership could be better deployed in education and training. The U.S. Department of Education and other agencies across the federal government are promoting the use of technology in education through this Working Group on Advanced Technologies for Education and Training. The interagency Advanced Technologies Working Group fosters and promotes the development, application, and deployment of advanced technologies in education and training in the United States. The Group convenes under the aegis of the President's National Science and Technology Council. The Department of Education's Director of Educational Technology and the Under Secretary of Commerce for Technology serve as co-chairs. Other members include: **U.S. Department of Agriculture, U.S. Department of Defense, U.S. Department of Energy, U.S. Department of Health and Human Services, U.S. Department of Homeland Security, U.S. Department of the Interior, U.S. Department of Labor, Institute of Museum and Library Services, Library of Congress, National Aeronautics and Space Administration, National Endowment for the Arts, National Endowment for the Humanities, National Science Foundation, National Security Agency, and the White House Office of Science and Technology Policy.**

The Working Group's agenda has two main areas of interest. First, inventory and examine federal investments focused on the development of advanced technologies for learning, and the development of digital libraries and other technology-enabled learning resources. The group will then determine how

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to strengthen this portfolio, and seek partnerships with the private sector, the academic research community, teachers, and other key stakeholders to promote and speed the development of these technologies. Second, the Working Group will explore and prioritize barriers to the commercialization, deployment, and adoption of these technologies. For more information on the Working Group, see http://www.visions2020.gov.

Finally, working together with other federal agencies, the U.S. Department of Education is promoting the value of broadband and other technologies for lifelong learning. Broadband technologies have great educational value as well as far-reaching economic impact and on March 26, 2004, President Bush announced a major broadband initiative with the goal of connecting every home to broadband by 2007.

Links to Federal Resources

U.S. Department of Education: The U.S Department of Education administers a number of programs to ensure equal access to education and promote educational excellence for all Americans, and to make sure that no child is left behind. Visit http://www.ed.gov and http://www.nclb.gov.

Federal Communications Commission: The FCC oversees the Education Rate (E-Rate) program which provides affordable access to advanced telecommunications services for all eligible schools and libraries in the United States. Contact the Schools and Libraries Division at http://www.sl.universalservice.org.

National Aeronautics and Space Administration: One of NASA's top goals is to "inspire and motivate students to pursue careers in science, technology, engineering and mathematics". The NASA website provides excellent online resources for teachers and students at http://www.nasa.gov.

National Science Foundation: NSF makes grants and awards in all areas of science, technology, engineering and mathematics education, as well as technology research. Contact NSF at http://www.nsf.gov.

For Further Information

See www.NationalEdTechPlan.org for many more resources and additional examples on the information presented in this report.

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U.S. Department of Agriculture: USDA's Distance Learning and Telemedicine Grants support telemedicine services and distance learning services in rural areas. Contact the Rural Utilities Service at http://www.usda.gov/rus/.

U.S. Department of Commerce: Commerce is focused on America's competitiveness by furthering innovations in cutting-edge science and technology and providing resources to manage an unrivaled information base. Contact http://www.commerce.gov.

White House Office of Science and Technology Policy: OSTP advises the President on the impacts of science and technology on domestic and international affairs. OSTP leads an interagency effort to develop and to implement sound science and technology policies and budgets and to work with the private sector, state and local governments, the science and higher education communities, and other nations toward this end. Visit http://www.ostp.gov.

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APPENDIX B

How This Plan Was Developed

In developing this Plan, the U.S. Department of Education actively sought out the advice and insights of a broad range of stakeholders, including students, educators, researchers, parents, higher education and industry leaders. The Department organized meetings for input into the plan and participated in numerous conferences of stakeholder groups at venues around the country; convening meetings with stakeholder groups, other federal agencies, and individual experts to engage them in thinking about the plan; and, soliciting input through the www.nationaledtechplan.org web site.

Over the course of the development of the Plan, the Department received input from over 1,500 individuals and organizational representatives, including from dozens of leading education associations and industry representatives. Input provided by these groups took a variety of forms, including in some cases, summaries of surveys or other consensus activities these groups undertook of their own memberships and/or constituencies. Educators (including current and future teachers and teacher educators) most frequently responded to calls for input. In addition, through a partnership with NetDay, the Department received additional input from another 210,000 K-12 students who participated through their schools in NetDay's Speak Up Day 2003.

Invitational Meetings to Provide Input into the Plan

Numerous meetings of practitioners, experts, and organizational representatives were convened to publicize the development of the National Education Technology Plan and to seek input and advice. Participants in invitational meetings organized by the Department follow below.

Briefings on the Development of the National Education Technology Plan

Sterlin Adams, National Association for Equal Opportunity in Higher Education (NAFEO), Silver Spring, MD

Donelle Blubaugh, National Coalition for Technology in Education and Training (NCTET), Alexandria, VA

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Gene Broderson, Corporation for Public Broadcasting (CPB), Washington, DC
Majorie Bynum, Information Technology Association of America (ITAA), Arlington, VA
Tom Carroll, National Commission on Teaching and America's Future (NCTAF), Washington, DC
Julie Copty, Association of American Publishers (AAP), Washington, DC
Nzigna Damal-Cathie, American Association of Colleges for Teacher Education (AACTE), Washington, DC
Buffy DeBreaux-Watts, American Board for Certification of Teacher Excellence (ABCTE), Washington, DC
Norris Dickard, The Benton Foundation, Washington, DC
Paul Gardner, Association of Educational Publishers (AEP), Logan Township, NJ
Melinda George, State Educational Technology Directors Association (SETDA), Arlington, VA
Michael Hill, National Association of State Boards of Education (NASBE), Alexandria, VA
Alisha Dixon Hyslop, Association for Career and Technical Education (ACTE), Alexandria, VA
Allan Jordan, North American Council for Online Learning, (NACOL), Boulder, CO
Don Knezek, International Society for Technology in Education (ISTE), Washington, DC
Keith Krueger, Consortium for School Networking (CoSN), Washington, DC
Richard Mainzer, Professional Standards and Practice Council for Exceptional Children (CEC), Arlington, VA
Sally McConnell, National Association of Elementary School Principals (NAESP), Alexandria, VA
Sara McPhee, National Association of State Directors of Career Technical Education Consortium (NASDCTEc), Washington, DC
Scott Montgomery, Council of Chief State School Officers (CCSSO), Washington, DC
Nancy Reder, National Association of State Directors of Special Education (NASDSE), Alexandria, VA
Margaret Rivera, American Association of Community Colleges, Washington, DC
Mark Schneiderman, Software & Information Industry Association, Washington, DC
Pat Shea, Western Cooperative for Educational Telecommunications (WCET), Boulder, CO
Irene Spero, NetDay, Irvine, CA

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Kendall Starkweather, International Technology Education Association (ITEA), Reston, VA
Barbara Stein, National Education Association, Washington, DC
Kimberly Tulp, Education Leaders Council (ELC), Washington, DC
Julie Walker, American Association of School Librarians (AASL), Chicago, IL
Robert Wickenden, Association of Educational Publishers (AEP), Logan Township, NJ

Exploring the Digital Generation

Research suggests that students today are coming to school with different expectations for their education due in large part to their use of technology in out-of-school settings. Today's generation of students represents an as of yet untapped impetus for school reform.

Stephanie Azzarone, Child's Play Communications, New York, NY
Robbie Blinkoff, Context-Based Research Group, Baltimore, MD
Kevin Bryne, Horatio Alger Association of Distinguished Americans, Alexandria, VA
Alice Cahn, Coliseum Live Entertainment, New York, NY
Sandra Calvert, Georgetown University, Washington, DC
David Dwyer, Apex Learning, Bellevue, WA
Julie Evans, NetDay, Irvine, CA
Peter Grunwald, Grunwald Associates, San Mateo, CA
Karen Jaffe, Child Trends, Washington, DC
Neil Howe, LifeCourse Associates, Great Falls, VA
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Leadership for System-Wide Rethinking

Influencing and empowering school leaders to make sound decisions is critical to leveraging the opportunities offered by technology.

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Virtual School and E-Learning Opportunities

Online courses and supplemental services are proliferating and offer increased high-quality choices for students and parents. State and local policies may be inhibiting their growth and adoption.

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Technology's Role in Teacher Quality

The definition of a high-quality teaching force must shift with the times – and along with it, colleges of education and professional development providers need to seek out new, innovative ways to train and support educators.

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Lajeane Thomas, Louisiana Tech University, Ruston, LA
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Drivers of Broadband Deployment

Education may serve as the greatest demand for the expansion of broadband connectivity to schools and homes. In this regard, school leaders have an opportunity and an obligation to shape telecommunications policy as it has the potential to affect schools.

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Anytime, Anywhere Technology Access

Increasing numbers of states and districts are seeing value in providing a computing device to each student. Valuable lessons can be learned and shared from these early adopters.

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Data-Driven Decision-Making, Accountability, and School Transformation

Having good data to guide decisions in schools and for instruction is critical to ensuring that all the nation's children achieve. New technological solutions have the potential to generate actionable data about school performance—in many cases for the first time.

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Budgeting and Funding Models for 21st Century Education Systems

Federal funds have disproportionately supported the purchasing of technology in schools, but innovative states and districts have rebuilt their budgets from the ground up to reflect the new opportunities afforded by technology. These sites are well-positioned for the future and are much better insulated from short-term funding fluctuations.

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Commissioned Papers

The Department commissioned several papers from experts to help inform the development of the Plan. These include:

Author	Paper
Katie McMillan Culp Margaret Honey Ellen Mandinach Education Development Center New York, NY	A Retrospective on Twenty Years of Education Technology Policy
Chrys Dougherty National Center for Educational Accountability Austin, TX	How States Can Use Information Technology to Support School Improvement Under NCLB
Glynn D. Ligon ESP Solutions Group Austin, TX	A Technology Framework to Support Accountability and Assessment: How States Can Evaluate Their Status for *No Child Left Behind*
Steve Fleischman American Institutes for Research Washington, DC	The Role of Educational Technology in Meeting the Promise of Supplemental Educational Services
Bryan C. Hassel Michelle Godard Terrell Public Impact Chapel Hill, NC	How Can Virtual Schools Be a Vibrant Part of Meeting the Choice Provisions of the No Child Left Behind Act?
Glenn M. Kleiman Education Development Center Newton, MA	Meeting the Need for High Quality Teachers: e-Learning Solutions
Susan R. Collins KCH Strategies Seattle, WA	e-Learning Frameworks for NCLB

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APPENDIX C

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APPENDIX D

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See www.NationalEdTechPlan.org for many more resources and additional examples on the information presented in this report.

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