

*A Series of Modest Proposals to Build 21<sup>st</sup> Century Skills*



# **A Laptop in Every Backpack**

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**May 1, 2007**



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### **Executive Summary**

It is the core premise of this paper that the emergence of a single global communications network, composed of Internet, mobile, SMS, cable and satellite technology, is rapidly tying the world's people together, in one of the seminal events of the early 21<sup>st</sup> century. Increasingly, the world's commerce, finance, communications, media and information are flowing through this network. Half of the world's 6 billion people are now connected to this network, many through powerful and inexpensive mobile phones. Each year more of the world's people become connected to the network, its bandwidth increases, and its use becomes more integrated into all that we do.

Connectivity to this network, and the ability to master it once on, has become an essential part of life in the 21<sup>st</sup> century, and a key to opportunity, success and fulfillment for the people of the world.

We believe it should be a core priority of the United States to ensure that all the world's people have access to this global network and have the tools to use it for their own life success. There is no way any longer to imagine free societies without the freedom of commerce, expression, and community, which this global network can bring. Bringing this network to all, keeping it free and open and helping people master its use must be one of the highest priorities of those in power in the coming years.

This paper offers thoughts on one piece of this commitment – how we best bring the power of this network to America's schoolchildren. Achieving the American Dream in

this century increasingly requires fluency in the ways of this network and its tools – how to acquire information and do research, how to construct reports and present ideas using these new tools, how to type and even edit video. We believe we need a profound and urgent national commitment to give this powerful new 21st knowledge, essential for success in this century, to all American school children.

We believe that America needs to put a laptop in every backpack of every child. We need to commit to a date and grade certain: we suggest 2010 for every sixth grader. These laptops need to be wirelessly connected to the Internet, and children need to be able to take them home. Local school districts should choose how best to do this, but there needs to be federal funding and simple, federal standards. Funds and strategies for how training our teachers to lead this transformation need to be part this commitment.

We believe it will cost at first \$2 billion a year to provide every 6<sup>th</sup> grader a laptop, about what we spend in Iraq every week. Hardware costs continue to plummet each year, and the idea of a \$200 laptop or classmate PC is coming ever closer to reality. It is not a question of resources, but of vision and political will. Libya has just announced a national commitment to give all its school children a laptop. If Libya can do it, so can America.

Giving our children the tools for computer literacy is the 21<sup>st</sup> century equivalent to teaching them how to read. In the “flat world” described by Tom Friedman, there can be no life success without it this knowledge, no real chance to seize the American Dream, no secure and prosperous road to the middle class. We believe giving every school child a laptop must be an essential part of any strategy to ensure broad-based prosperity for America in the 21<sup>st</sup> century.

So, let’s look at what it might require to put a laptop in every backpack.

### **Current Conditions**

The starting point for participation in today’s global communications network is to own a computer and have Internet access. According to the Pew Internet and American Life Project and Intel Corporation, there are still 30 million American households that do not have a computer.<sup>1</sup> This gap in access has become progressively more troubling as technology has progressed from a tool that provides a competitive advantage to a baseline need for social, civic, economic and educational participation. Students in the 21<sup>st</sup> century must be equipped with the skills and tools to succeed and participate in our

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<sup>1</sup> Intel Corporation and Pew Report: Digital Divisions. Pew Internet and American Life Projects, 2006, <http://www.pewinternet.org>.

increasingly technology-rich, knowledge-based economy. For school-age children, the consequences of not being a part of the digital age are daunting. Technology has become increasingly important for academic success, as computer and high-speed Internet access are shown to raise students' test-taking aptitude and provide a superior resource for homework help, school research and information gathering.

The irony of this situation is that in the 1990s, the United States held the position of world leader in pioneering technology applications and the Internet. Our innovation had a profound impact on our and the world's economic and educational growth. For example, within the Telecommunications Act of 1996, the E-Rate program was created which ensured that all schools, rural or urban, rich or poor, have affordable Internet access. According to the American Youth Policy Forum, today 98% of American schools have access to the Internet because of the E-Rate program.<sup>2</sup> In addition, investments by the Bill and Melinda Gates Foundation in the 1990s allowed for the near ubiquity of Internet access (98.9%) in public libraries around the country<sup>3</sup>.

Despite our early lead in developing technology applications and policies, in recent years we have lost our leadership position. According to the International Telecommunication Union, the United States has fallen to 15<sup>th</sup> in the world in broadband penetration rates.<sup>4</sup>

Innovation has shifted as education systems abroad have recognized the need for technology in education. The lack of leadership demonstrated in the United States, juxtaposed with the advances that have taken place abroad, will put us in a less competitive position tomorrow.

In addition to these issues of technology leadership, the U.S. is lagging behind because access to computers and the Internet in this country are still somewhat related to income and race. A study from a May 2006 Report by the Pew Internet and American Life Project found that only 21% of people earning less than \$30,000 a year have broadband access, whereas 68% of households earning \$75,000 or more a year have access.<sup>5</sup> According to a report released by the U.S. Census Bureau in 2005, 63.9% of white households have a computer in their home and 57% have access to Internet. Only 44.6% of African-Americans have a computer in their house and only 36% had access to

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<sup>2</sup> American Youth Policy Forum, *Connecting Kids to Technology: Challenges and Opportunities*, <http://www.aypf.org/forumbriefs/2002/fb071802.htm>.

<sup>3</sup> John Carlo Bertot, Charles R. McClure, Paul T. Jaeger, & Ryan J., *Public Libraries and the Internet 2006: Study Results and Findings*, For the Bill and Melinda Gates Foundation and the American Library Association, Sep 2006, [http://www.ii.fsu.edu/plinternet\\_reports.cfm](http://www.ii.fsu.edu/plinternet_reports.cfm).

<sup>4</sup> ITU Strategy and Policy Unit Newslog - ITU Broadband Statistics for 1 January 2006, <http://www.itu.int/osg/spu/newslog/ITU+Broadband+Statistics+For+1+January+2006.aspx>

<sup>5</sup> Horrigan, John. *Home Broadband Adoption 2006*. Published by Pew Internet & American Life Project. May 28, 2006, [http://www.pewinternet.org/pdfs/PIP\\_Broadband\\_trends2006.pdf](http://www.pewinternet.org/pdfs/PIP_Broadband_trends2006.pdf).

Internet. Among those of Hispanic origin, 44.3% have a computer in their household and 36% have access to Internet. Asian Americans fared better than any other racial group with 72.9% having a computer in their household and 66.7% having Internet access.<sup>6</sup> Those gaps are closing, but we need to close them faster.

America must re-establish itself as a leader in preparing our children to participate in the global economy by ensuring that all public school children regardless of race, income or geography have access to the tools of the 21<sup>st</sup> century digital age.

Outside experts estimate initial costs of \$2 billion in the first year, which will enable every 6<sup>th</sup> grader in America to acquire a laptop. Once implemented, increased costs would be incremental rather than exponential and will rise over time, depending on the decisions of policymakers about how quickly and how broadly to scale implementation to additional grade levels. The constantly decreasing costs and increasing life-span of hardware will help mitigate cost increases and there are achievable economies of scale that can be reached depending on the choices of our policymakers.

### **Computers in the Classroom**

To begin preparing all children for participation in today's global communications network, we must ensure that there is a laptop in every 6<sup>th</sup> grader's backpack to use in the classroom and at home. Not only is computer access a fundamental necessity to participate in today's global communications network, it also significantly enhances academic performance and student achievement.

A study by Stanford's Institute for Economic Policy Research (SIEPR) reports:

- "Positive evidence supporting computers' effectiveness" showing that computer and technology use increases the aptitude of a child who is performing at the 50<sup>th</sup> percentile level to between the 59<sup>th</sup> and 72<sup>nd</sup> percentile.
- Lower-achieving students experience much greater benefits from access to computers than those who are already high-achieving students.
- Home computer users scored, on average, three to five percentage points higher than students without home computers.<sup>7</sup>

In a decade-long series of studies, students in classes that use computer-based instruction outperformed their peers on standardized tests of basic skills achievement

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<sup>6</sup> Computer and Internet Use in the United States: 2003, U.S. Census Bureau, October, 2005, <http://www.census.gov/prod/2005pubs/p23-208.pdf>

<sup>7</sup> Noll, R.G, Older-Aguilar, D., Ross, R.R., Rosston, G.L (2000). "Bridging the Digital Divide: Definitions, Measurements, and Policy Issues." In *Critical Path Analysis of California's S&T Education System: Bridging the Digital Divide*. Noll, R.G (ed.) Stanford Institute for Economic Policy Research (pp. 1-27). [http://www.ccst.ucr.edu/publications/2002/CPA\\_6\\_DD.pdf](http://www.ccst.ucr.edu/publications/2002/CPA_6_DD.pdf)

significantly.<sup>8</sup> These benefits occur because technology provides a teacher with an arsenal of tools that are more effective than basic textbooks. By providing students with computers in the classroom, they can engage with real-time information not included in textbooks, access resources without having to wait for a free computer in a lab, and master multimedia presentation and communication skills.

Teachers who use computers in the classroom can drill students on specific topics for which they need extra help. Computer programs provide individualized instruction and instant feedback that motivates students to continue with their lessons. Moreover, curricula can be geared to meet the particular learning needs of students and can allow them to gather their own information and resources. The use of laptops can also allow school districts to save significantly on text books, while connecting their students to diverse sources of content that are the best available in their respective subject areas. This is not to suggest that traditional materials should be eliminated and that conventional classroom instruction should be discarded, but rather that by leveraging the tools of technology we can overcome some of the instructional constraints found in the four walls of a classroom with one teacher and thirty students.

The innovation of the Internet reduces the barriers of race, income and geography in America's public school system. Young people, whether they reside in geographically isolated rural communities or attend a failing inner city school, can have access to premiere educational resources with the click of a mouse. That access provides a robust set of course options available online from foreign language to Advanced Placement classes.

Further, more than 90% of students aged 12 to 17 use the Internet to find "better information" than the information found in schoolbooks.<sup>9</sup> This is particularly useful in under-performing schools where resources may not be available and textbooks are often out-of-date.

### **Computers at Home**

Evidence supports that students should have the opportunity to take home a computer in the same way they would a textbook. Providing a laptop for every schoolchild creates equality between those who have computers at home, and those who don't.

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<sup>8</sup> Kulik, Kulik, and Bangert-Downs, "Effectiveness of Computer-based Education in Elementary Schools," *Computers in Human Behavior*, 1, (1991) 59-74; Kulik and Kulik, "Effectiveness of Computer-Based Instruction: An Updated Analysis," *Computers in Human Behavior*, 7 (1991) 75-94.

<sup>9</sup> "National Survey Finds Kids Give High Marks to High Speed; Internet Considered Crucial for Educational Success," SBC Communications, Inc. August 4<sup>th</sup>, 2004.

<http://www.sbc.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=21284>

The ability to take a computer home is critically important. For example, students report that their daily use of the Internet drastically differs from in-school Internet use. According to the Pew Internet and American Life Project, Internet and computer reliance to complete homework assignments takes place primarily “outside of the school day, outside of the school building, outside of the direction of [students’] teachers.”<sup>10</sup> By providing students with access to a laptop, students can go online at any time and in any location to access tutoring and homework help.

According to a recent survey, among high school age children (ages 12-17) the following statistics have been reported:

- 80% of students have coursework that requires using the Internet at home.
- Almost 65% of students utilize the Internet to work on school assignments at home.
- Nearly 60% of students aged 12 to 17 use the Internet to access dictionaries, thesauruses and encyclopedias.<sup>11</sup>

It also provides an opportunity for parents to use the laptop for educational and asset building purposes. A recent study of One Economy’s work funded by the John S. and James L. Knight Foundation and conducted by SRI International and the Pew Internet and American Life Project found that adults who were provided with a home computer used it for a variety of purposes including to:

- Search for and apply for jobs.
- Make purchases and pursue educational opportunities.
- Engage in banking and take classes online.
- Exchange e-mail, make informational inquiries, read or listen to the news, conduct research for school, and interact with friends.

In addition, technology offers new and exciting ways for families to increase involvement in their children’s education by checking progress reports, attendance and test results as well as assignments through schools’ websites. Laptop ownership at home and at school facilitates a greater level of collaboration among students, teachers, and parents and results in greater academic success.

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<sup>10</sup> Levin, D. Arafeh S. “The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and their Schools” The Pew Internet and American Life Project. August 14<sup>th</sup>, 2002.

<sup>11</sup> Carlson, Natalie. “National Survey Finds Kids Give High Marks to High Speed.” Hispanic PR Wire. 13 Aug. 2004. SBC Communications, Inc. 11 Apr. 2007. Available online at: <http://www.hispanicprwire.com/generarnews.php?l=in&id=2774&cha=0>.

## Why Now

In today's 21<sup>st</sup> century global communications network, it is no longer just a competitive advantage for schoolchildren to have access to a computer. It is now a prerequisite for children to have this access both inside and outside of the classroom.

The fat envelopes that used to be stuffed in the mail by college applicants every year no longer exist. Today's high school seniors apply online and upload digital files of their grades, essays, and recommendations to the university's network

Furthermore, according to The Bureau of Labor Statistics, employment in professional, scientific, and technical services will increase by 28.4% and add 1.9 million new jobs by 2014. Employment in computer systems design and related services will increase by 39.5% and account for almost one-fourth of the 1.9 million new jobs created in professional, scientific, and technical services. Additionally, management, scientific, and technical consulting services also will grow by 60.5%, prompted by the increased use of new technology and computer software.<sup>12</sup>

It is not just increased professional opportunities that demand technology skills, in today's global communications network people are using their computers for a variety of major undertakings. The Pew Internet and American Life Project found that over a three-year period, Internet use grew by:

- 54% in the number of adults who said the Internet played a major role as they helped another person cope with a major illness. And the number of those who said the Internet played a major role as they coped themselves with a major illness increased 40%.
- 45% in the number who said the Internet played a major role as they made major investment or financial decisions.
- 43% in the number who said the Internet played a major role when they looked for a new place to live.
- 23% in the number who said the Internet played a major role when they bought a car.<sup>13</sup>

Our young people must be equipped with the tools necessary to navigate through today's global communications network. One advantage today versus the 1990s is that the costs for the tools of the digital age have been significantly reduced. In recent years,

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<sup>12</sup> United States Department of Labor, Bureau of Labor Statistics, Tomorrow's Jobs, <http://www.bls.gov/oco/oco2003.htm>.

<sup>13</sup> Horrigan, John. *The Internet's Growing Role in Life's Major Moments*. Published by Pew Internet & American Life Project. April 19, 2006, [http://www.pewinternet.org/PPF/r/181/report\\_display.asp](http://www.pewinternet.org/PPF/r/181/report_display.asp).



as the cost for computing devices and broadband decreases and connectivity and mobility of these devices increases, there are fewer practical concerns surrounding the implementation of a program to provide every child a mobile, computing device.

### **Success Stories**

Beginning in Boston, Massachusetts in the 1990s, and followed soon after with other technology initiatives, urban and rural communities across the country began reporting a widespread increase in positive academic outcomes through the use of technology.

- Boston, MA  
In 1998, Boston became the first major urban school district to build high-speed technology networks in each of its school buildings and public libraries. In addition to the district's network construction, Boston developed the Technology Goes Home initiative, providing access, training, and curriculum through public schools. Boston schools also offered student graduates and their family's new computers, printers and Internet access for less than \$15 per month. The cumulative result of these programs was a 15% increase in the number of graduates attending college from the previous district average of 65% to 80%.<sup>14</sup>
- Henrico County, VA  
Henrico County, Virginia has one of the largest "one-to-one computing" initiatives of any school district in the U.S. In one survey 97% of mathematics and science teachers reported that the computers have helped students to learn these challenging subjects, and 59% report that the laptops have helped "a lot" or "a great deal." In addition, more than 80% of students reported that it is "helpful" or "very helpful" to have a computer to use for their schoolwork. These reports were corroborated when state standardized test scores increased and dropout rates decreased.<sup>15</sup>
- Maine  
In Maine, where the Department of Education has equipped all the state's 7th and 8th grade students and teachers with access to wireless internet-enabled laptop computers for the past 4 years, students are completing more homework and misbehaving less than in previous years. Moreover, there is improved student interaction with teachers, particularly among at-risk and low-achieving

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<sup>14</sup> "Measuring Digital Opportunity for America's Children: Where We Stand and Where We Go From Here," The Children's Partnership, 21, <http://www.childrenspartnership.org/AM/Template.cfm?Section=Home&Template=/Search/SearchDisplay.cfm>

<sup>15</sup> SRI International (22 June 2004). SRI International and EDC Study of Largest District-Based Laptop Computer Initiative Demonstrates Benefits of "One-to-One Computing" in schools Available online at: <http://www.sri.com/news/releases/06-22-04.html>

students, and improved class participation and student motivation. In addition, more than 75% of teachers reported that having the laptops helped them better meet Maine's statewide learning standards.<sup>16</sup>

### **Greene County, NC: A Model Success Story**

Perhaps most striking is the example of Greene County, a small rural county in eastern North Carolina. Predominantly agrarian, Greene County has been ranked as the county most dependent on tobacco production in North Carolina, and the second most tobacco dependent county in the United States. Generations of Greene County farmers have harvested and sold flue-cured tobacco.

In recent years, the tobacco industry has seen a significant decline in its popularity and prosperity. Domestic tobacco sales plunged from \$47.7 billion in 1990 to only \$18.9 billion in 2000, and the numbers continue to plummet. As the demand for tobacco has fallen, the number of unemployed agricultural workers has risen. Today, 70% of Greene County's K-12 schoolchildren receive free or reduced-price lunches.

The economy in rural North Carolina is changing and workers must adapt to a new economic order. A 1999 survey showed that an unprecedented 30% of North Carolina farmers expected to give up tobacco farming in their lifetime, and 68% were interested in expanding to other enterprises.

Beginning in November 2003, a diverse team of stakeholders including the Greene County local government, the school system, grassroots leaders, and social service providers partnered with One Economy to respond to the economic changes in our increasingly technology-rich, knowledge based economy. The partnership is rooted in activities to:

- Bring ubiquitous access to broadband and computing to Greene County.
- Improve the economic livelihood of county residents.
- Increase the economic competitiveness of Greene County.
- Improve academic performance among county-schoolchildren.

The technology investment began at the school-level by bringing Apple iBook computers to each 6<sup>th</sup> through 12<sup>th</sup> grader in Greene County, with 85% of these computers traveling home every evening with the students.

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<sup>16</sup> Silvernail, David L. and Dawn M. M. Lane (2004). "The Impact of Maine's One-to-One Laptop Program." Maine Department of Education. Available online at: <http://www.maine.gov/mpuc/broadband/activities/MLTIPhaseOneEvaluationReport2004.pdf>.

### Greene County by the Numbers

#### Educational Outcomes

- SAT composite scores increased by 41 points since the beginning of the project.
- High school proficiency scores increased from 53% to 78.4% since 2003.
- More than 80% of the 2006 Senior Class applied to college compared to 28% of the 2004 Senior Class.

#### Economic Development Outcomes

- Last year, twelve new businesses were attracted and opened in Greene County after years of negative business growth.

#### Improved Broadband Availability

- Broadband access increased from 10% to 90%.
- More than a dozen church and community buildings have become hot spots for free Internet access and these locations are the host for the free technology training.

### **The Opportunity to Provide a Laptop for Every American Schoolchild**

Despite the unambiguous case for ensuring every American schoolchild has a computer, it remains increasingly likely that unless a national initiative is put into place, millions of students, most likely inner-city minorities and low-income residents of rural communities, will remain isolated from technology and its inherent benefits.

It is essential that our children be provided with access to the tools that are necessary to navigate and participate in the global communications network. Without deep fluency in the new tools offered to them through this startling information revolution, our children will be at a competitive disadvantage and their opportunity for life success will be diminished. America's policymakers must ensure that no matter where people live public school children have the skills necessary to be active participants in the emerging society of the 21<sup>st</sup> century.

We can start this process by committing, together, to put on a laptop in every backpack of every American school child.

### *About the Authors*

**Alec Ross** is the Executive Vice President for External Affairs and a co-founder of One Economy, a multinational nonprofit organization that works to maximize the potential of technology to help low-income people enter the economic mainstream.

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