John Gage

Co-Founder of NetDay
Chief Researcher and Director of
Science, Sun Microsystems

JOHN GAGE

CO-FOUNDER OF NETDAY
CHIEF RESEARCHER AND DIRECTOR OF SCIENCE – SUN MICROSYSTEMS

For vision, leadership, hard work, and results in Bringing Technology to the Classroom AND Creating Partnerships between the Community and Frontline Educators.

Bringing Technology to the Classroom:

Phase1 Physical Connection: NetDay began in 1995 as a grassroots volunteer effort by companies, educators, families and communities to wire the nation's K-12 classrooms for internet access. The first national wiring event was held in March 9, 1996 in California where an estimated 50,000 volunteers wired 4,000 schools in a single day. Since then NetDay mobilized over 500,000 volunteers to wire more than 75,000 classrooms in 40 states across the country – all as a volunteer effort.

The value of this volunteer time alone is over $100 million, and in most situations, NetDay also organized in-kind contributions hardware valued at much more. In Silcon Valley alone the in-kind donations amounted to over $27 million. In Massachusetts the savings were estimated to be $35 million. NetDay's contribution has been particularly important in providing internet connection know-how to less financially well off and rural areas where resources are often constrained. John had a vision that included teaching and energizing volunteers to connect the classroom, and he founded an organization – NetDay to make it happen.

Phase 2 Capturing, Sharing, Using, and Improving Best Practices: With over 95% of our nation's schools and 80% of the classroom's now connected NetDay's focus has shifted to identifying and sharing best practices in how to effectively integrate technology into teaching and learning.

As the physical connection becomes common, the barrier to improving education has moved to creating an understanding of how to properly use technology among educators and teachers themselves. NetDay works to eliminate this barrier by providing an online clearing house and dissemination mechanism. This tool helps educators to share real stories – both good and bad – about how to use technology productively in the classroom. Examples include surveys of teachers about their access and use of technology, the results of pilots where all of a schools 6th graders received laptops, a blue print for an 'electronic school', and many, many more.

NetDay continues to work to effectively integrate technology into teaching and learning. John saw that the physical connection was just the first barrier and created ways to capture, share, use and improve best practices for the use of technology for teaching and learning.

Creating Partnerships between the Community and Frontline Educators

Perhaps more important than the benefit NetDay has provided school systems in the form of a physical connection to the internet, and the connections with best practices they continue to provide educators, are the connections that NetDay fosters between educators and the community. NetDay energizes people to help in the school. They

teach people how to mobilize the community by showing them how to plan, solicit donations train, and volunteers. As a result they've energized businesses donate cabling, network equipment, computer hardware and software as well as tools, food, t-shirts etc. As the result of NetDay many companies formalize relationships with schools, initiated school discounts, and made education a priority in their philanthropy programs. NetDay is a leader in creating untapped public-private partnerships.

John has created an organization that does more than does good work. The organization he created connects schools with the community. This connection will probably do more good than any cable.

Vision, Leadership, Action and Results

John was the prime motive force behind NetDay. His vision saw what was possible. His leadership brought the organization into being. His hard work saw that the organization was effective. The results speak for themselves.

Because of John's contribution:

- Students in literally thousands of classrooms are connected and learning in new ways;
- Educators and teachers continue to learn about how to use technology more effectively;
- The community, school systems, and governments are working more effectively together in literally hundreds of cities.

Go to www.netday.org to find out more about NetDay.

Thomas, Otto, CIV, OSD-PR

From: Gabert, Trent E [tgabert@ou.edu]
Sent: Monday, October 15, 2001 12:47 PM
To: Bruce Bellende (E-mail); Charles Coble (E-mail); J. Ford Brett (E-mail); Jules LaPidus (E-mail); Marcia Brueggen (E-mail); Marilyn Stenvall (E-mail); Michael Feinberg (E-mail); Michael Wolfe (E-mail); Otto Thomas (E-mail)
Subject: FW: Brock Nomination

The following information should be copied and placed in your folder for the nomination of John Gage. It was inadvertently omitted here in my office last week when materials were forwarded to you. I do hope that everyone has received the materials by this time?

Any other questions?

Best regards,

Trent

Trent E. Gabert, Ph.D.
Associate Dean, College of Liberal Studies
Professor, Health and Sport Sciences
Rm. 226 Administration Bldg.
1700 Asp, Norman, OK 73072-6400
405-325-1061

John Gage Bio...

John Gage is the Chief Researcher and Director of the Science Office, for Sun Microsystems, Inc. <http://www.sun.com/>
He is responsible for Sun's relationships with world scientific and technical organizations, for international public policy and governmental relations in the areas of scientific and technical policy, and for alliances with the world's leading research institutions.
In 1995, Gage created NetDay <http://www.netday.org/>, a volunteer project to bring the resources of world high-technology companies to all schools and libraries to connect them to the Internet. Since then over 500,000 volunteers have wired over 50,000 schools and libraries in the United States. NetDays are planned in over thirty-five countries for 2001. Gage is on the board of NetDay and Schools Online <http://www.schoolsonline.org/>, a non-profit organization dedicated to connecting the world one school at a time.
In late 1999, President Clinton appointed John to his Web Based Education Commission, <http://www.webcommission.org/>which recently issued its report <http://interact.hpcnet.org/webcommission/index.htm>.
The Joan Shorenstein Center <http://www.ksg.harvard.edu/presspol/publications/advisoryboard.htm> on the Press, Politics and Public Policy at the Kennedy School of Government <http://www.ksg.harvard.edu/kennedy.shtml> named Gage as one of five distinguished journalists and scholars to be its 2000 Fall Fellows. He taught a course on "Technology, Media, and Governance" during the fall semester, 2000.
Gage is also a frequent host on Sun's "Digital Journey" <http://www.sun.com/digitaljourney>- and ongoing series of Web-based multimedia programs that seek to gain a more complete understanding of new and emerging technologies in their business, social, environmental , and cultural contexts.
Gage attended the University of California, Berkeley

<http://www.berkeley.edu/>, the Harvard Kennedy School of Government <http://www.ksg.harvard.edu/kennedy.shtml>, and the Harvard Graduate School of Business <http://www.hbs.edu/>. He did doctoral work in mathematics and economics at the University of California, Berkeley, and left Berkeley in 1982 to join Bill Joy at Sun Microsystems.
He is a member of the Mathematical Association of America <http://www.maa.org/>, the Association for Computing Machinery (ACM) <http://www.acm.org/> the Institute of Electrical and Electronics Engineers (IEEE), <http://www.ieee.org/> and the Board of Trustees of the Internet Society (ISOC). <http://www.isoc.org/>
Gage has served on scientific advisory panels for the US National Research Council <http://www.nrc.edu/>, the National Academy of Sciences <http://www.nas.edu/>, and the Multimedia Super Corridor <http://www.mdc.com.my/>project of Malaysia.
He has also been a member of the Board of Regents of the US National Library of Medicine <http://www.nlm.nih.gov/>, the Board of Trustees of Fermi National Laboratory, <http://www.fnal.gov/>and the External Advisor Council for the World Bank. <http://www.worldbank.org/>
Gage lives in Berkeley with his wife Linda, and their two children, Peter and Kate

J. Ford Brett
Office: (918) 828-2511 (I check messages frequently)
Cell: (918) 645-2496 (works when I'm in US)

> -----Original Message-----
> From: Ford Brett
> Sent: Thursday, October 04, 2001 9:26 AM
> To: 'tgabert@ou.edu'
> Subject: RE: Brock Nomination
>
> Trent -
>
> Attached is a bio for John Gage - that should help broaden understanding
> of who he is a bit.
>
> By the way, he is prepared to come in July if necessary.
>
> thanks,
>
> << File: John Gage Biography.htm >>
>
> J. Ford Brett
> Office: (918) 828-2511 (I check messages frequently)
> Cell: (918) 645-2496 (works when I'm in US)
>
>
>
> -----Original Message-----
> From: Ford Brett
> Sent: Sunday, September 30, 2001 6:05 PM
> To: tgabert@ou.edu
> Subject: Brock Nomination
>
> Trent -
>
> Attached should be my nomination - is this too long or too short?
> (I'm still getting a 1/2 page resume)
>
> << File: John Gage Brock Nomination.doc >>
>

> J. Ford Brett
> Office: (918) 828-2511 (I check messages frequently)
> Cell: (918) 645-2496 (works when I'm in US)
>
>
>

Brock International Prize in Education

John Gage, '02 Nominee

Presented by Ford Brett

For vision, leadership, hard work, and results in Bringing Technology to the Classroom, Using Technology in Classroom, AND Creating Partnerships between the Business, the Community, and Frontline Educators.

Who Is John Gage?

- Chief Researcher & Director of Science Office for Sun Microsystems
  - Graduate UC Berkeley and Harvard Business Schools
  - Board of Trustee: Fermi National Laboratory & the Internet Society (ISOC)
  - Member Scientific Advisory Panel: National Academy of Sciences, US National Research Council
  - Board of Regents: US National Library of Medicine
  - World Bank External Advisor Council
  - 1998 Association for Computing Machinery Special Pres. Award
- Leader using Technology for Education
  - Served on Presidential Web Based Education Commission
  - Fellow at Kennedy School of Government: "Technology, Media, and Governance"
  - 1999 Smithsonian Award – Technology Leadership for Education
- Most importantly, the creator of NetDay
  - Mission: to connect every child to a brighter future by helping educators meet educational goals through the effective use of technology.

What is NetDay? - History

- Started in 1995 as a volunteer project to bring the resources of high-technology companies to all schools and libraries to connect them to the internet.
- Organized the know-how, volunteers, and in kind contributions to wire entire schools literally in one day at NO cost to the school.
- Over 500,000 volunteers have wired over 50,000 schools in 40 states.
- NetDay has been duplicated in over 35 countries and has connected thousands and thousands of more classrooms internationally.
- Value of US volunteer and in kind contribution is >$200 million in the US alone. Cost to duplicate effort was estimated by V.P Gore commission at >$800 million.

What is NetDay? - Current Direction

- ***Crossing the Digital Divide*** - Community driven project connecting students & their teachers in under-served communities with the necessary resources to facilitate learning through education technology.
- ***NetDayCompass.org*** - an online clearinghouse of education technology resources for teachers and administrators in K-12 schools to help them make informed decisions about technology integration in schools and classrooms.
- ***Leadership Campaign for Education Technology*** - a national and state-level program focusing on how to develop, nurture and promote effective models of leadership for our K-12 schools on education technology.

Does John Qualify?

"... person who conceived, developed, and promoted the concept..."

"... to enhance primary and secondary education... "

"... recent **national** or **international** discovery or **contribution** to the science and art of education has had a **significant impact** on the **practice** or **understanding** of the field of education"

"... should have the potential to provide long-term benefit to all humanity through change and improvement in education...

"... including new teaching techniques, the discovery of learning processes, the organization of a school or school system, the radical modification of government involvement in education, or other innovations."

Because of John ...

- Students in literally thousands & thousands classrooms in >35 countries are connected & learning in new ways;
- Educators and teachers continue to use technology more effectively;
- The community, business, school systems, and governments are working more effectively together to help meet educational goals through effective use of technology across the country.
- Easily >$250 Million impact from Netday volunteer and in-kind contributions.

What does this say about the Brock Prize?

"The purpose of the Brock Prize is to identify the best ideas on education in the world and to expose them to our educators, teachers, administrators and politicians"

John Brock

John Gage's Ideas (and accomplishments):

- Energizing business and the community to help schools;
- Having teachers share best practices how to use technology;
- Building technology leaders in schools.

What does this say about the Brock Prize?

- We are about Change... NOW.
- We are about promoting and sharing best practices.
- We are about energizing EVERYONE to work together to help educate our kids.

net day

NetDay Endorsements

"NetDay is a key element of our broad national strategy for joining American advances in technology with the needs of our schools and children....Many school lack the physical infrastructure to connect to the Internet and to take advantage of other advanced telecommunications services. NetDay can help change this, and serve as a catalyst to meeting our broader goals: increasing the number of computers in the classroom, developing new educational applications, and giving teachers the training they need to use these exciting tools effectively."

- President Bill Clinton

"NetDay sponsors, organizers and volunteers will help to build a bridge to the 21st century for all of our nation's children – rich and poor, urban and rural. There is nothing more important than providing young people with the resources and opportunities they need to succeed in the future."

- Vice President Al Gore

"I am urging everyone who is connected with schools, or who could be connected to schools, to get involved and get active. The longer we delay in bringing the essential resources of the Internet and Information Superhighway to every school and library in the nation, the longer we ensure that our students will be learning at something less than world-class standards."

- Former U.S. Secretary of Education, Richard Riley

"NetDay is a fine example of how individuals can provide all our children with tools they need to face the demands of our ever-changing information-based economy. NetDay activities across America have saved and will continue to save schools and taxpayers millions of dollars in technology start-up costs by providing equipment, computer time and training for teachers."

- U.S. Senator Dianne Feinstein, D-California

15707 Rockfield Blvd., Suite 110 • Irvine • CA 92618
voice 949.609.4660 • fax 949.609.4665 • www.netday.org

"We know to thrive as citizens and workers in the 21st century, today's students will need the technical competence and mental agility to function in the information age. NetDay represents the best of America's tradition of community support for its public schools. As the staff who work in public schools, we welcome with open arms community members who are coming into our schools to ensure that America's students receive the highest quality education."

- Barbara J. Yentzer, Director, National Education Association, Center for Education

"NetDay is all about partnerships – between industry, schools teachers, parents, students and the community. Cisco has a history of successful partnerships. I encourage others to follow our lead. NetDay is a win-win for all partners."

- John Morbridge, Chairman of the Board, Cisco Systems

" Our national service network of over one million Americans is encouraged to join, to lead, and to lend its support to service organizations, such as NetDay, that bring together national service participants, community volunteers, and partners in a burst of energy and attention to a community problem. I am confident that NetDay will continue to gain momentum as more and more teachers, parents, students, community volunteers and businesses join together to meet the technology needs of our nation's schools."

- Harris Wofford, former CEO, Corporation for National Service

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Go to www.netday.org to find out more about NetDay.

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Biography

(Click here for condensed version)

John Gage is the Chief Researcher and Director of the Science Office, for Sun Microsystems, Inc.

He is responsible for Sun's relationships with world scientific and technical organizations, for international public policy and governmental relations in the areas of scientific and technical policy, and for alliances with the world's leading research institutions.

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In late 1999, President Clinton appointed John to his Web Based Education Commission, which recently issued its report.

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Gage is also a frequent host on Sun's "Digital Journey" - and ongoing series of Web-based multimedia programs that seek to gain a more complete understanding of new and emerging technologies in their business, social, environmental , and cultural contexts.

Gage attended the University of California, Berkeley, the Harvard Kennedy School of Government, and the Harvard Graduate School of Business. He did doctoral work in mathematics and economics at the University of California, Berkeley, and left Berkeley in 1982 to join Bill Joy at Sun Microsystems.

He is a member of the Mathematical Association of America, the Association for Computing Machinery (ACM) the Institute of Electrical and Electronics Engineers (IEEE), and the Board of Trustees of the Internet Society (ISOC).

Gage has served on scientific advisory panels for the US National Research Council, the National Academy of Sciences, and the Multimedia Super Corridor project of Malaysia.

He has also been a member of the Board of Regents of the US National Library of Medicine, the Board of Trustees of Fermi National Laboratory, and the External Advisor Council for the World Bank.

Net Day In The Delta: An Opportunity To Succeed

Two years ago, West Bolivar School District in Rosedale, Miss., forged a groundbreaking partnership with an orgranization committed to helping schools get, maintain and use technology effectively. The district so rich in traditions based on geography...
By Kirstin K. Reynolds - September 2001

Audrey Pearson has dug her heels into the soil of her own history in order to unite her small community and engender system-wide change. Like most of the staff working in the West Bolivar School District, Pearson was born and raised in Mississippi, and (to echo a presidential line) she's very interested in seeing that "no child is left behind."

"I want to see strong school plans in place where teachers know what is expected of them, and curriculum that integrates technology. I want to see the community thriving," said Pearson. "We've got to give these people, who are isolated, an opportunity to succeed. All of our kids across the Delta need the same opportunities. My dream is to take something that is scalable and replicate it across the larger community."

As NetDay's Digital Divide project director for the Mississippi River Delta Empowerment Zone and an advocate for the three schools in the district, she is in a good position to do just that. And as part of a larger national effort, NetDay and the team of educators at West Bolivar are having an impact.

AN EQUALIZING EFFECT

Although living in one of the most economically challenged school systems in the country, Leslie Barger's students at Rosedale, Mississippi's West Bolivar Elementary School have explored the ancient pyramids of Egypt. "I've been learning about mummies and different languages lately," said Justin Ward, age 8. "The Internet allows for a more student-centered classroom," Barger said. "I see children exploring and discovering their own interests at their own pace. They're taking responsibility for their own learning, and they love it." Barger helps to ensure that students like Ward won't be left behind.

Like its rich, resonant blues and the steadfast Mississippi, the area's people fill the landscape with resilience and determination. In a

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Presentations, Partners, Statistics and Facts on Technology in Education

Judy Cutts
Since she began working in the West Bolivar Schoc District in 1975, elementary school princi Judy Cutts has been committed to doing everything she can to hel her community's children succeed.

"Fifteen years ago, there wasn't a computer in the school. A colleague and I got the first computer by collecting $100,000 worti of grocery receipts. Ther was no staff developmen at that time. We were sel taught, and we shared th first IBM on a rolling cart never thought we would have the Internet, we jus wanted more resources f teachers.

"My inherent desire is to have input from teachers I want to empower teachers to share a visior We are looking for teachers who are willing work in teams. I have a driving desire to give kid the best that they can have. We have to do everything possible and believe our children can learn despite their backgrounds and socioeconomic levels. Many of our kids come in with low language development and a lack c experience and exposure before entering school.

"I have such a desire to see students succeed, I'll be here for a long time. It's too exciting. We wan to work on developing community so we can sustain this."

The Connected Class
Fourth-graders in Renee LaMastus' class at West Bolivar Elementary have traveled to the Amazon t

school where a meal costs just 50 cents, very few students can afford to eat. Ninety-four percent of the county's children receive free and reduced school lunch. Home to a team of teachers, leaders and school administrators rooted in Delta traditions, the community has resolved to keep their children, families and educators connected to each other, and to the rest of the world. As a student, Ward sees clearly the value of such experiences. "It's important to have the Web available at school because most of my friends don't have computers at home."

CONNECTED CLASS, CULTURAL SHIFT

Five years ago, NetDay, an organization committed to helping schools obtain, sustain and use technology effectively, set out to wire all schools to the Internet. Since then, they've impacted school districts across the country with their dedication to helping teachers use technology to improve education.

In 1999, the West Bolivar School District forged a groundbreaking partnership with NetDay.

Superintendent Jordan Goins is a 32-year veteran of the school district and a Mississippi native. "Our district's partnership with NetDay has been a blessing," he said.

In 1995, a Mississippi State Board of Education initiative asked each school district to generate a five-year technology plan. In response, Goins and his team sat down to strategize about where they stood with technology, where they wanted to be, and how they were going to get there.

"I would like to see a cultural shift where kids are asking for computers for Christmas instead of PlayStations," said Goins. "We also want to see more computers in homes, and to open our doors to the co mmunity by providing our schools as a center of learning."

When NetDay proposed a partnership in 1999, the district was armed with a blueprint that outlined their vision of the future. The Mississippi Delta is a federally designated Empowerment Zone (EZ), one of the urban and rural areas entitled to receive federal tax incentives and direct funding for physical improvements and social services. As one of five EZ programs in NetDay's Digital Divide initiative, the district has received a wealth of hardware and software, including 58 new iMac computers, Volition cabling, 3M fiber and networking equipment from Marconi/Fore Communications.

All of the district class- rooms are now wired thanks in great part to NetDay. NetDay CEO Julie Evans said the organization realized early on that providing schools with hardware and wiring isn't enough. "Wiring doesn't make a magical difference. Our focus is on educational impact, and doing in-depth work in schools." NetDay's most vital resource was not part of the infrastructure.

HOME TEAM ADVANTAGE

learn about the rainforest Via the Web, they've witnessed a kaleidoscope of people touring New Yo City's Times Square amid its famous theaters, flashing billboards and savvy street vendors.

Nine-year-old Jasmine Thomas took a cyber-fiel trip to Manhattan while reading George Selden's "The Cricket in Times Square" in LaMastus' clas and said that she loved getting to see the city "fc real," instead of just looking at photographs.

"Instead of talking about something in a book, we can actually see how people live," said LaMastus. "When we wer reading 'The Great Kapok Tree,' we didn't want to just talk about the rainforest. We wanted to go beyond that. We took the students to a real rainforest on the Web. They were amazed, and we got into a great discussion about people and how different people live."

Building Hope Net Day an Explornet

Seventeen-year-old senic Elosha Johnson plans to t a doctor, but if she changes her mind, she'll be making diagnoses as a computer technician. Johnson, who is enrolled Mike Hendricks' ExplorNe computer repair and recycling class at West Bolivar High School, has learned how to break dov computers and rebuild them from scratch.

"You think that it's going to be very complex, but we've learned that workir on computers is actually easy," said Johnson.

Hendricks said, "A lot of students come in not knowing how to turn on a computer or where the power button is located. hand them a screwdriver and ask them to take it apart. It helps them get over their fear of breakin it."

Pearson keeps West Bolivar's technology plan moving forward by interacting daily with teachers, school administrators and community members. Pearson gathered a team of skilled teachers to write grants, secure local resources, train other teachers, and to assure that the technology they now have -- will be used, maintained and upgraded.

"Audrey is an invaluable resource. If we didn't have her, we couldn't make things move here," said West Bolivar Elementary School principal Judy Cutts. "She's critical to making the technology work."

Pearson, who graduated from West Bolivar High School (formerly Rosedale High School) taught in a first-grade classroom, and she is currently working on her master's degree in community development. She and her team wrote a Technology Literacy Challenge Grant that enabled the district to purchase 50 new computers. "We have to make sure that the content we are offering is valuable and that our teachers are trained."

"We have the best chemistry in the world," said Arthur Holmes, West Bolivar Middle School's assistant principal and the district's technology coordinator. He said things are working in the district because of the camaraderie between himself, Goins, Pearson and the district's incredible teachers. "The most important thing I've done is to surround myself with good people, visionary people. It's worked out beautifully here."

"To make a plan work, it takes a team that is aware of what should be, and what can be -- and then makes it happen," said Goins. With their heels dug in, this Delta community is moving its children forward.

Kirstin K. Reynolds

Kirstin Reynolds, a former NYC public school teacher, currently works as a freelance writer and technology coordinator at Syracuse University's Living SchoolBook project.

This year, Hendricks' students have taken 26 donated Compaq computers and upgraded third of them for school classrooms. Donations come from a variety of local companies, but Hendricks said that Audre Pearson's help has been crucial. "Audrey has gott the computers here and wired, and she and NetD have been instrumental i the growth of this program."

"Anything we can do to give these kids exposure to technology will help them in the future and begin to bridge the Digit Divide," said Hendricks. "These kids deserve it."

Web Sites

ExplorNet

NetDay

Contact Information

Audrey Pearson
NetDay Digital Divide
Project Director,
Mississippi River Delta
Empowerment Zone
E-Mail

Arthur Holmes
Assistant Principal
West Bolivar Middle Scho

District Technology
Coordinator
E-Mail

Jordan Goins
Superintendent, West
Bolivar School District
E-Mail

Judy Cutts
Principal, West Bolivar
Elementary School
E-Mail

Related Converge Articles

Dec. '00, "Building the Digital Bridge in Boston"

Jan. '00, "An Apple a Day for Education"

May '99, "Connections fo Life in Rural Northern California"

TECHNOLOGY

Sun scientist plugs in schools

John Gage, chief researcher at Sun Microsystems, has helped to connect more than 50,000 U.S. schools and libraries to the Net.

By **Andrea Hamilton**
February 25, 2001

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Internet

Free the

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educatic

This article is from the February 13, 2001, issue of Red Herring *magazine.*

John Gage talks to a lot of important people. As chief researcher and director of the science office at Sun Microsystems (Nasdaq: SUNW), it's his job to maintain the company's relationships with the world's governmental, scientific, and public policy bodies. But some of his best work has been at the grassroots level. His NetDay initiative -- a project to wire public schools to the Internet -- depends on volunteers to string the cable. Since 1995, the effort has connected more than 50,000 U.S. schools and libraries to the Net. Next year, there are plans to expand NetDay to more than 35 countries.

How well does distance learning work?

Those forms of human knowledge that can be taught theoretically, abstractly, discussed without interaction, can be taught just fine in the distance-learning format. They work even better with the new elements added. The lecture format today can be improved immediately by adding this time-delay, interactive format -- stop and start it, annotate, reviews. That works across the Internet, across TV channels, across audio: the graphics, the illustration, interaction with the lecture. This is a richer learning environment than what we've had before, without this technology.

There is a range of new multisensory inputs that aid the process of education. In some areas, these are fundamentally powerful -- biological research, structural engineering -- areas of manipulation of objects that must obey the laws of physics.

But what about that interactive element?

Nothing replaces the immensely powerful use of human language to communicate -- that immediate response, that element of teaching which is so hard to quantify, that intelligence about human relationships that some people have and others don't. But the new technologies provide something powerful that we've not had before. For instance, we have the capacity to create 3D graphic models that appear in the room where the people online are listening to a lecture. It's expensive, but it does work.

There are some ways that technology overcomes that. You can build an environment across the network that destroys the distance that separates people, up to several hundred miles. The latency problem kills you if farther away than that. It's that sense of being there that is fundamental in some forms of teaching. The truly artful teacher will always be in enormous demand.

Considering its price tag, can online learning give students in the developing world a first world education?

The total experience of being at Harvard or Stanford is meeting people, interacting -- constant and intense conversation. It's impossible to create those circumstances in a remote village. However, access to the lectures, the reading materials, the insights, the conversations -- even remotely -- is far more than what exists today. There's an opportunity for millions to have a part of the experience. So distance learning will really be a supplement, complement, and definitely a factor of change, but not a replacement, to traditional education.

What about Bill Gates' argument that technology can't solve these problems, that the digital divide is an artificial problem when people are lacking food and water?

Bill Gates is correct in quoting what everyone has been saying for a long time: first you should help people be healthy, stay alive. Of course. What Gates unfortunately doesn't understand is, the tools of information are exactly the tools needed to help prolong people's lives, by applying the knowledge of public health measures, the knowledge of behavior, the knowledge of changes and culture that allow you to live longer.

In a world where liberty and freedom are fundamental you have a choice, so there has to be a capability of learning what the implications are of a course of action you take. That is the reason information technology's drop in cost makes such a potential difference in the lives of billions of people. Suddenly the knowledge is accessible about the implications of one course of action or another. If there is no clean water and no way your children can stay healthy, you have no choices. The role of information technology is to add to the spectrum of choices you have by allowing you to be more informed about what those choices are.

Is online education going to be driven by the demand for business degrees?

Today's economy is shifting. Today you can think of jobs that are extremely well paying that didn't exist five years ago. Webmaster? Who ever heard of that? These jobs are built on top of Web connectivity. There are older students with families who need to be able to compress their learning into a short enough period of time that they can afford to do it and have it raise their income level by changing their qualifications. The online versions that provide this level of education fill an area of great demand. What's the quality of the material they provide? It seems the students taking these

courses are quite content, and their employers are content. The University of Phoenix stepped into a gap that the existing institutions were too slow to move into.

Will it change what is taught?

Those that are in businesses today in a functional role -- treasurer, chief financial officer -- have knowledge that is immediately useful to people outside. So we'll see more and more short courses or seminars, drawing on the immediate experience of someone in a specific job area. It's not a scholarly course -- English literature, computer science -- but it's a practitioner's course, like a professional school. A sort of technical training will suddenly be accessible to many more people than have had access to it in the past.

Is e-learning a threat to the ivory tower?

The elite universities -- Harvard, MIT, Berkeley, Stanford -- have several functions. One of them is to bring people together -- much of the education takes place with the students teaching each other. That immediate physical concentration of people is the essence of the elite university. That will always be paid for by people. When you put material that's presented in classes on the Internet, it loses, to some degree, the intimacy of conversation. On the other hand, the material can be made available across the Internet in new and powerful ways -- the authority to do simulations that enable a student of biology to see proteins forming bonds, to see it because the computer computes what it would look like based on theory and gives him an intuitive feel for the physical world that is unobservable -- making things invisible become visible. We'll see new ways of teaching and learning made available across the networks at essentially zero cost to as large an audience as cares to share with them.

What are the key challenges to Internet-based learning?

One of our most serious troubles overall is the Web interface, which requires good vision, a pointing device, and the ability to read. Most people don't satisfy these requirements, so they're not familiar with this metaphor. The explosion of the potential of Internet-linked learning will come when voice and gesture interfaces -- the ability of high-speed chips and cheap video to recognize features, to watch expressions -- become available. That will happen in the next two or three years.

There has been a lot of improvement in voice recognition but it's still not 100 percent. Is the computer ever going to get close enough?

In some areas computer-based speech recognition will always be deeply challenged because human beings create an enormous amount of context when they listen to someone else's speech. The setting, their knowledge of the person, their understanding of the general intent of that person, and what they say. All that is added to the spoken word. The computer has only the spoken word. That will change [with] the programs people write to attempt to provide context, to understand something.

In education, the primary power is creating conversations where no conversations were possible before. Bridging the gap. Fourth grade biology teachers, fifth grade science teachers are trapped in their classrooms. They never meet the fifth grade science teacher across town. Suddenly with the network they can collaborate, so when someone does a particularly nice lesson there is a means to find it, and the cost has gone to zero on transmitting it. Those who are interested in something will find each other

now that the tools are here -- and they'll profit from the conversation.

Is this the drive behind NetDay?

Allow parents, teachers, students, to begin a conversation. No deep goal, just the notion that connectivity yields new conversation. New conversation yields new answers to old questions. They also yield new questions. The most valuable result of the NetDays was the coming together in a community of people concerned about a school. Bringing resources to the schools is hard. Budgets are difficult, people are busy. When you find the commitment in someone to contribute their time, their efforts to improving the school, you've made a net improvement.

It seems commercial opportunities at this level have kind of dwindled.

Most of the money that goes into elementary education goes to paying the teachers. There should be more money and more resources that goes into supporting the teachers in developing curriculum and new methods of teaching. The policies in the schools are to create free access to the Net. This is a component of the tools available to the teachers and students.

We're seeing a change in the kind of teaching. What's missing is the support for the teachers to invent new ways of using this technology. The big gap now lies in the teacher education program. Today if you go to get a teaching credential you may well take a curriculum of 20 years ago with very little exposure to the new technology. Now most teacher colleges are attempting to change, but they are not funded, and they find it very difficult to build the environment to teach the teachers. We're finding technology in the hands of the children is far greater in capacity than the technology available in the teachers colleges. So it leads to this gap again between the teachers' capabilities and the kids.

ADDITIONAL RESOURCES John Gage spoke with Ken Klingenstein, director of information technology systems at the University of Colorado at Boulder, about a range of technology and education-related issues following his opening session speech at the CAUSE97 conference.

A terrific interview with Mr. Gage by *Wired* magazine that, despite being from 1996, is not at all out of date.

Gage expounding on NetDay.

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Corporate training goes to the head of the class >>>

April 25, 2001

Tech Update

Teachers Complain of Little Time To Use Internet

Most teachers are convinced that the Internet is an important tool for their profession and that access to it improves the quality of education, but they complain of having too little time to use it, according to a survey of 600 public and private school teachers released this month.

Some teachers said the survey's findings ring true for them as well as their colleagues.

"For me, technology has become as much a tool as a pencil or pen would be—it's become innate to what I do," said Timothy D. Comolli, an English teacher at the 860-student South Burlington High School in Vermont.

Echoing some of the survey's findings, Mr. Comolli, who runs a computer-animation lab at his school, said too many teachers must go outside their classrooms to the school library or a special technology lab to get Internet access. And that simply takes too much time, he said.

The survey was conducted by Washington-based Lake Snell Perry & Associates, and the Tarrance Group, an Alexandria, Va., firm. The survey's margin of error is 4 percentage points.

Among other responses, the poll found that more than 90 percent of the teachers have Internet access in their schools, a finding consistent with surveys by the federal government's National Center for Education Statistics.

Yet 60 percent of the respondents said they used the Internet in school less than 30 minutes a day.

In addition to reporting they have little time for online activities,

about half the teachers cited shortages of equipment, slow Internet-access speeds, or a lack of technical support as hindering their use of online resources. And two-thirds of the teachers said they did not believe the Internet was "well integrated" into their teaching.

Beyond those findings, 55 percent of the teachers reported that they used the Internet for the most part as a tool to conduct research or gather information for lessons. Smaller numbers use the Internet as a professional-development tool (36 percent); to keep their calendars, Web bookmarks, and addresses (30 percent); or to monitor student work (22 percent).

Forty-two percent use it to communicate with other teachers or students, 20 percent go online to communicate with parents, and 18 percent use the Internet to post lessons for students.

The survey also found that 87 percent of teachers now feel comfortable using the Internet for school-related purposes, but only about a third said they feel "very comfortable."

The survey was commissioned by NetDay, an Irvine, Calif.-based group that helps schools use technology effectively.

Data-Driven Decisions: As schools spend more money on technology, they are feeling greater pressure to show results for those investments. But weighing the impact of technology is not simple, concludes a new guide for school leaders published by the North Central Regional Educational Laboratory, a federally financed research center in Naperville, Ill.

The guide discusses seven critical issues that technology evaluations should take into account. It emphasizes that:

For More Information

Order "Planning for D3T: Data-Driven Decisions About Technology," at no charge, from NCREL. The guide comes with a planning tool on a CD-ROM.

- The impact of technology infusion into schools is directly connected to the effectiveness of other school improvement efforts.

- Current practices to evaluate technology should be broadened to include such factors as learning goals, professional training, and home access to technology.

- Scores on standardized tests are a limited indicator of technology's effectiveness.

- Schools must document their technology evaluations in ways that satisfy a diverse set of constituents, from parents and taxpayers to

business leaders and state officials.

- Evaluations of technology should use a common language. For example, terms such as "technology integration" sometimes mean different things to teachers than to administrators and have different meanings in different districts.

- Teachers play a crucial role in evaluating technology, but the burden of proving its effectiveness is shared with school officials and others.

- Some school policies need to be changed to match the new needs of schools that use technology. For example, schools need to consider whether they should keep their buildings open after regular hours to offer computer access to students and members of the community.

—Andrew Trotter

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CAUSE/EFFECT
A practitioner's journal about managing and using information resources on college and university campuses

Technology and Change: An Interview with John Gage

John Gage, Director of the Science Office at Sun Microsystems, was the opening session speaker at at CAUSE97. After his presentation, he and Ker Klingenstein, Director of Information Technology Systems at the University of Colorado at Boulder Boulder, sat and talked about a number of technology-related issues. Following are excerpts of that conversation.

A sample of the actual interview is available in RealVideo (28.8k)

To take advantage of RealVideo you will need to obtain RealPlayer 5.0 from the RealMedia Website. See the CAUSE file help page for details on configuring your browser to view these files.

Klingenstein: *I've come to believe that managing complexity is going to be the biggest task at the turn of the millennium, in terms of technology and our personal lives. Do you see any way to manage complexity?*

Gage: The tools we've always used, personal relationships with people you respect, are going to be what we rely on. But managing, where you're trying to understand where things are going, is different than judging what's amusing or personally beneficial.

In the management world, complexity is a complexity of people, and it's becoming far more complicated. If you look at the structure Sun has built as an

industrial company, we have people who came from Taiwan, or from the **Indian Institute of Technology** in Delhi. They come to California, they make friends, they leave. They become part of an American company for awhile. The Taiwanese pass through two or three years in Silicon Valley, meet everybody, then go back to Taiwan and start companies there, using these friendships and links.

Suddenly, we've been relying upon friends and co-workers. Now it's five or ten years later, and we're relying on this web of people for parts, technical predictions about what they're going to do. We're telling them what we need, but they're in different time zones, speak different languages, and have different reliance on governmental policies. That kind of complexity, we're beginning to layer, as we break up this centralized notion of who's in charge. It's a bit like the original Internet in the academic days when one smart graduate student would post code and someone in New South Wales would fix it in an hour and send back a fix. It's a distributed global environment. The tools we have to make this work must be the same tools that, in theory, we in education develop. We need the ability to tell the good from the bad. Good taste is what is required to manage complexity. Without good taste, the cacophony will rule.

Klingenstein: *We don't have a course in good taste or critical thinking anymore.*

Gage: That's a shame. When I look at how we manage, 90 percent of what's presented in management meetings is either wrong or not thought through. The way the company works globally, you have to instill in people some way of judging what each action does in relation to the mission of the overall organization. If you have no coherent mission, then there's no coherent behavior. People just go off and do things.

How do you pay people in a way that gets them to do certain things that are profitable overall for the company? This is art. I used to think this was boring. Turns out it's not boring. It's motivating people. The Sun ethos of open access is more believed in the remote ramparts of the Roman empire than it is in Rome. In Rome, you have people who came from **DEC** and want to charge you for everything. In China and Ireland are the true believers in the Sun way of life, and they're saying it's not proprietary. It's open. You like the source code? -- here's the source code. That overall sense of direction is the one way you can use as a touchstone. Do I raise the price to the customer, or do I decrease the price and help them so it seeds something else? Little distinctions can change overall behavior enormously.

Klingenstein: *How do you create openness out of proprietary attitudes? How does one take a Microsoft and reintroduce competition?*

Gage: The pathway we've embarked on relies on breaking up all the large monolithic pieces of software into smaller objects. Recently I saw a Web page of a series of calendar JavaBeans that this company is now offering for sale. You incorporate them into your application. They've done a very sophisticated job of keeping track of dates on many different calendar systems. You don't have to learn any of that. You just take their Bean and incorporate it into your application

and pay them a little bit.

As we build an object economy, which goes down through the operating system, a scheduler could be an object you could use. You don't need to use Sun's. We'd begin to build new markets in components. That's the pathway that will allow us to break up the existing software monopolies. Because the software provides functions that are multifaceted, you can break them up into things that are useful. For example, I'd love to be able to take the full-text indexing systems that exist, and index by meaning the natural language that allows you to break words up. That should run in conjunction with the word processor. As I'm writing something, in the background, the words I'm writing are being broken out, morphologically the endings are taken off and it's compared. Now I get a deeper kind of help in writing in a literate way. It would point out a certain word isn't really in a right spot. I can't do that today in any easy way on a word processor.

If they're defined properly, the interfaces allow add-on capability. Java is the particular vehicle for this. We'll bring out something that allows you to put a layer into your existing system that deals with all services provided to your system, whether disk storage services or networking services. They all will come to you in this distributed system. Software talks to them. It slowly eats away the functionality that's now embedded in a large operating system.

Klingenstein: *The politics of technology is very hard. I'm wondering if the Justice Department has the wherewithal to understand this and go in carefully with scissors and snip apart the monopolies?*

Gage: I'm a technological determinist in the sense that I think that if we have the framework for the breakup of the existing monolithic software into objects, then there's an economic and technical inevitability. We'll want to be sure that the objects we compose to make a particular application are from people we trust, that have some kind of a liability link, some way we believe that this will all work. That structure will be a survivable commercial structure.

Today, you buy from Microsoft because you've heard of them, they do a pretty good job. If you're confronted with someone with a similar piece of software and you've never heard of them, you're much less likely to buy from them.

Klingenstein: *It's an interesting premise that the fruit will fall from the tree and we don't have to cut it.*

Gage: That's our hope; it may be naïve. On the politics of technology, the poor lawyers only have blunt scissors. There's no mechanism they have to get inside this world. In some sense, we've just got to do it ourselves.

Klingenstein: *I'm curious about how we're going to preserve interoperability against proprietary standards. It feels like the standards processes are breaking down.*

Gage: It turns out it's really quite painful. In things you can define clearly, it's not changing. To pick twenty-three core objects that must be shipped, that seems

pretty clear but is becoming more fuzzy. Each of the objects could have inside it some changes, which is what Microsoft did. They altered some of the methods to do things, which just don't work. You expect the object to behave one way and it doesn't behave that way. Then they eliminated a couple of objects from what they shipped. The remote method indication object, which is one they left out of Internet Explorer 4, you have to get into your own machine and embed it in the class hierarchy. This is definitely subverting the ad hoc standards process.

The parallel track is to put the standards under International Organization for Standardization (ISO) control with existing mechanisms for countries and companies to participate. That was redone when ISO recognized that eight years to standardize C++ was a crime. ISO, to develop standards in a rapidly changing world, must alter its procedures.

How do you do this? We plan to let anybody submit a standard and let everybody vote and we'll argue about maintenance of the standard. However, we want the cycle time to be a year or six months, not eight years. Sun will play. OMG [**Object Management Group**, a consortium of software vendors and end users] said they'd play. A variety of different groups went into this procedure and submitted the work they'd already done as a standard and found it accepted by an international standards body. We want to figure out a way to maintain it. That's the language we're trying to work out now. We're all in agreement, pretty much, about the directions, with the possible exception of the part of Microsoft that's trying to derail the whole thing. It seems we can move together collegially. The benefit to people will be of such a magnitude that there's no reason to fight it.

Since we beat Microsoft thoroughly, globally, on this first-round vote, they've learned now that people really do want to have something that is not under any particular company's control, including Sun's.

Klingenstein: *This **ISO** process is kind of the equivalent of the Request for Comments (RFC) used in the development of the Internet. It may be that the RFC process, this meta discovery mechanism, is the enduring legacy of the Internet.*

Gage: That's exactly right. The brilliance of the RFC mechanism, the populism of it, the openness of it, is the model for all of this. When we went to ISO, we said, "You must modify how you behave. When we followed the pattern of all requests for information the way the Internet worked, when we did that with Java and put code up, anyone could comment. What we discovered in that process was the student at Upsala had a comment that was more valuable than the comment from Microsoft, or Intel. We need you, ISO, to alter your procedures to allow comments from anyone, not just a country committee." ISO blinked twice and said, "We'll do it." We've altered procedures for establishing global standards by allowing any person to comment.

Klingenstein: *When they talked about creating a footprint in the floor of a telephone company, it was a visible thing they could understand. How do you create a footprint inside an operating system?*

Gage: Sun Vice President Ivan Sutherland has a wonderful idea. What we should do is eliminate all restrictions on wiretap, so it's completely legal. You can wiretap your wife, your wife can wiretap you, you can wiretap your neighbor. However, also make it perfectly legal to have completely powerful encryption to protect yourself. That will create a market overnight. You get a little device you plug in to your phone. Now you're secure.

We're in this current plunge toward massively accessible...it's just a boon to law enforcement beyond anything they ever dreamed. Law enforcement doesn't know how much power they have. My cell phone, I turn it on, you know where I am. We're locating ourselves, every call we make. This phone stores in it my last ten calls and how long they were. I call somebody or they call me, their phone number pops up on the screen. There are a lot of instances where you don't want somebody to have your phone number, but you're not going to go through the mechanism of having the call cut off at the phone company. We're weaving a web of complete disclosure.

Privacy and knowledge of your environment, the boundaries of civilized behavior, are being eroded. It used to be possible for the two of us to talk to each other, with complete certainty that no one else could hear. The walk in the woods is your only alternative now. However, with parabolic microphones or with any number of devices, you can't even do a walk in the woods anymore. Your location, every interaction you have with this expanding web of electronic commerce, every interaction you have with any component of technology, is now being marked. I saw a number recently that in New York City a typical working resident has his or her picture taken twenty times a day. It can happen at a street intersection, when entering an office building, in an elevator, or through a fire alarm system. These video surveillance systems are everywhere for reasons of security.

The major move forward in image processing capability means your face could be recognized fleetingly at the bank, the ATM, or any number of places during the day. Every time you do a transaction they're going to take your picture, or scan your iris.

This web of information can be used for good or for evil. Law enforcement loves it because they can catch the bad guys, but the fundamental, ideological conviction of law enforcement is that everybody is a bad guy, or a potential bad guy, so they want to know. It leads to these extraordinarily restrictive environments, as biological, genetic analysis becomes more powerful. It leads to a breakdown of society's absorbing responsibility, spreading the risk. I can now identify people who have genetically very advanced risk. If I can identify them, why should the rest of us pay for those people? You lead into some very difficult ethical and political environments. Knowing too much about each other can be a very serious danger to being able to hold a normal conversation. There's a reason why our thoughts are not transferred to everyone else.

Klingenstein: *There's a story about Enrico Fermi walking the grounds of the Institute for Advanced Studies at Princeton a couple of years after the bomb. He*

saw a turtle crossing his path in the woods, and picked it up to take home to his children. Fermi walked a few feet down the path, stopped, turned around, left the turtle where he found it and explained to a friend, "I think I've done enough to disturb the universe for one man's lifetime." What turtles would you put back?

Gage: The turtles are out of the bag. We've unleashed this capability. The American ethos, the engineering ethos, were pragmatic: Here's a new tool, use it. That is carrying us in a path towards, I don't want to call it invasions of privacy, but enormous accumulations of information about things, which can destroy completely the universe, the balance, the harmony that's hard enough to create.

Two people attempting to get along is a serious problem. Now with information about everyone easily accessible, it lets the fringe components of our society have leverage and power over institutions and people in ways that have never been possible before. In some sense, you want to cut the power and pull the plug.

There's a second side to it that is good. In attempting to understand the power of the industrial mechanisms we've built, we never took into account emission of chlorine atoms, or any number of things that resulted in ozone holes or the global carbon monoxide and dioxide. Alterations will kill you fast or kill you later. These off-the-balance-book results of people multiplying and industrial growth, if made visible, can cause behavior that could counterbalance them. In that sense, knowing more about the processes of environments we create and are involved in can be very helpful.

Given the existing technologies of powerful encryption, I believe we can regain the control over information about us, restrict the amount that is usable to others, and focus on the good side of all this information, which might allow us to truly account for all of our activities in a healthy way. Every time there's a polluter, there's a polluter who's not paying the cost of the pollution. It's the others that bear the brunt. It's these off-the-book expenditures which are supported by the society as a whole. Now we can get a grip on some of these things and perhaps manage them better.

Klingenstein: *It's pretty clear that we're a technology-driven society. How do you get away from this personally? How do you escape?*

Gage: I have simple routines that remove me from this. I find that it gets to a point -- and the point is arriving more and more frequently -- where I simply push away all this. The 200th e-mail in a day. My fiftieth voice-mail message. This constant sense of equal priority for everything. It forces you to distinguish things. I just turn it off. I don't listen to my voice mail. I don't read my e-mail. I go to the coffee shop near my house and I read something. I'll go to a lecture or a concert.

It's very different ideas and rhythms, dance and harmonies, different language and vocabularies, that let me suddenly think of something new. It's odd juxtapositions and richness of culture that lead me to think of something new.

The environment of e-mail and quotidian messaging of day-to-day life, it's all the same. I don't get that richness and mixture.

I've begun to learn that it's vital to mix in your life the ability to go out and confront the unexpected by breaking out of all the established patterns and being a human being, trying to see how other human beings live. That is the renewing experience. Often I'll go to a lecture and I'll listen to the words but I use them as a counterpoint to stimulate something that I've been thinking about. C. Wright Mills did a wonderful thing. He would write, think, ponder some question. He'd work out some theory. Yearly, he'd take all his files and writings, everything filed chronologically or by subject, and dump them on the floor. All the clippings; he'd dump them on the floor. For a week, he'd get on the floor and pick up a piece of paper. The juxtaposition, completely serendipitous, would cause him to think of something new. That was almost mechanical, but very powerful in source of inspiration. It's like poetry, where an odd juxtaposition of words has an incredible power to invoke new thought.

I spent a lot of time with contractors. I discovered they have eyes I don't have. They can look at a wall, a room, a building and see exactly what's behind the wall. They know what is needed. They know what they'll find in what to me is a perfectly impenetrable surface. They see through it. I began to see as they do. Then I began to watch still photographers and video photographers. They're very different. The people taking color pictures will move to a certain place to take pictures. Other people will move to a different place, the ones with the black and white motorized cameras. You begin to watch their positioning. I'm not there. Even if I were physically there, I wouldn't be in the same place. They have an amazing fusion of seeing things and this ability to get these pictures. I began to appreciate those plays where some character will describe what happened and the next character describes it very differently, and the third character is very different again. That's our lives. If we pay attention to the most minute detail, there's an enormous richness. It comes from accident.

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