

KEEPING THE PROMISE OF THE 21ST CENTURY: BRINGING CLASSROOM TEACHING INTO THE DIGITAL AGE

Educating students for the digital age challenges teachers to gain new knowledge and skills to a degree that is unparalleled

The digital age has transformed how work is done in science, health care, the law, journalism, international relations, education, environmental conservation, agriculture, engineering. To prepare students to thrive in today's society, teachers need to know more about how technologies are used in disciplines and workplaces, and—most critically—how to use the right technologies to support student learning in specific subject areas.

Gone are the days when teachers could use computers merely for basic drills. Conducting research, evaluating sources of information, displaying data, solving problems, working collaboratively on written and oral presentations—these are the new “basic skills” of the 21st century. Never have such strenuous demands been placed on practicing teachers to master new ways to teach new skills.

Many schools have computers available for classroom use. Yet computers themselves don't teach teachers or students how to use them. Teachers need high-quality, subject-matter-specific, hands-on experiences and ongoing school-based support to make wise use of technologies for learning.

Studying an R&D investment in the National Writing Project

The National Writing Project (NWP) is a teacher professional development network whose mission is to improve the teaching of writing and the use of writing to learn in science, mathematics, and other subjects. NWP has built a nationwide infrastructure of more than 200 local sites, all of which are school-university partnerships where K–12 teachers and college faculty work side by side to strengthen teaching. Located in all 50 states, Washington, D.C., Puerto Rico, and the U.S. Virgin Islands, NWP sites provide professional development programs for nearly 100,000 educators per year, as well as providing direct services to about 10,000 students in summer writing camps.

NWP is distinctive among professional development providers. It is a network of teachers who build leadership and knowledge of teaching and learning from systematic study of their own classroom practices and the practices of colleagues, as well as from research. These leading teachers—called teacher-consultants—share their professional knowledge and practices with other teachers through local NWP professional development programs.

NWP received federal funding intended to expand access for K–12 teachers to high-quality professional development. These funds supported programming about technology integration during the years 2004–2007. Inverness Research studied NWP's Technology Initiative, focusing on the results of targeted grants to NWP sites in 11 states as well as on growth in teacher participation in NWP technology programs nationwide.

This brief presents lessons learned from the initiative, along with implications for policy supports that are needed to help teachers bring their classrooms into the digital age.

KEY FINDINGS

Quick return on investment in NWP

The federal investment effectively leveraged the national infrastructure of teacher leadership established by NWP's network of school-university partnerships in order to quickly develop new professional development opportunities for teachers.

Over the four years of the Tech Initiative, NWP accelerated growth in its cadre of teacher-consultants, created new classroom-tested practices, produced 35% more programs on using technology for teaching, and reached 43% more participants (teachers, administrators, students).

Lessons learned about teacher development

Teachers learn best from other teachers who have expertise in both subject matter and uses of technologies for learning. There are relatively few leading teachers with expertise in both areas. It takes focused, sustained effort to build this leadership capacity.

It is difficult and time-consuming for teachers to learn how to use new technologies well. This calls for new approaches to professional development.

Lessons learned about teaching with technology

The best uses of technology involve students actively in subject-matter-based practices that are tied to learning goals.

Teachers who use technology skillfully to teach their content areas are able to re-engage and motivate struggling students.

Reality checks

Although most schools are wired, classrooms may or may not have working computers and access to other technical infrastructure. Many school districts create “firewalls” that block student access to Internet research and cross-school communication.

Students in poorer schools, where they need working technology most, usually have the least.

Current educational assessment and accountability mandates offer few incentives to districts to provide professional development in subject-matter-based uses of technology.

About Inverness Research

Inverness Research (IR) is a national educational evaluation and consulting group headquartered in Northern California. IR has over 20 years' experience studying local, state, and national investments in the improvement of education. IR has studied the National Writing Project infrastructure and programs since 1994. See www.inverness-research.org.

RAMPING UP NWP CAPACITY TO TEACH TEACHERS

NWP built on its existing national infrastructure of more than 200 local sites to ramp up its capacity to help teachers learn to use technology better for teaching and learning. The NWP model for leadership development in technology—where leading teachers are supported in developing technology expertise in their own classrooms—enabled NWP sites to expand their cadres of teacher-consultants who could share their knowledge with other teachers through local professional development programs. The work of NWP sites participating in the Tech Initiative included creating new programs that were specific to teachers in their local areas, as well as building broader partnerships that enhanced their states' capacity to teach teachers.

Examples from the Field

Maine's state-sponsored Laptop Initiative put a laptop computer into the hands of every 7th grader. Through NWP's Tech Initiative, teacher-consultants from the Maine Writing Project supported the Laptop Initiative by teaching teachers how to help students get best use of their laptops for learning and composing.

The state of **Missouri** sponsors a Literacy Academy to promote excellence in teaching. Because of NWP's Tech Initiative, Missouri teacher-consultants were able to bring 21st century digital literacy practices to the Academy.

Working with the University of Oregon's Center for Advanced Technology in Education, teacher-consultants from all five NWP sites in **Oregon** formed a 20-person "tech team." These teachers are leaders in their own schools and travel the state providing professional development for teachers.

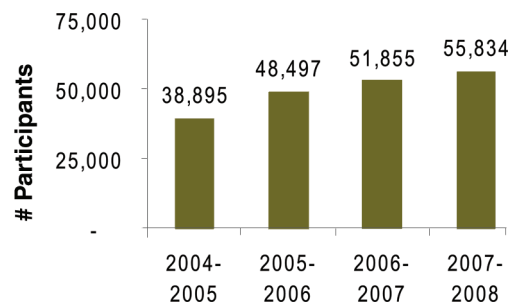
In **Michigan**, small teams of teacher-consultants who travel to NWP's annual national meeting create podcasts and blogs to share their experiences with colleagues back home. These cost-efficient tools enable teachers to share information at a distance and give teachers knowledge they can apply to their classroom teaching.

The NWP site in western **Massachusetts** used the Technology Initiative to link up students in urban and rural districts, breaking down cultural barriers and creating a motivational context for students to hone their writing skills. The Initiative gave teachers in both districts new opportunities for professional learning.

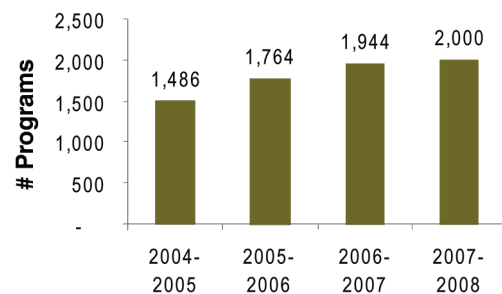
The **New York** City Writing Project created open forums where teachers could meet regularly to develop innovations in their classrooms, share information about new technologies, and test teaching ideas. Many teachers participated in these "Tech Thursdays" voluntarily for testing digital tools, solving technical problems, and building repertoires of new practices to share with their colleagues.

Nationwide Growth in NWP Tech Programs

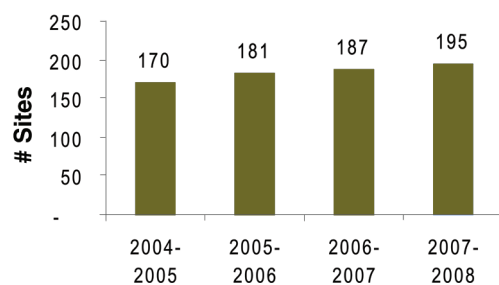
Number of participants (teachers, administrators, students) in all tech-related NWP programs



Number of NWP programs that include content related to using technology for teaching



Number of NWP sites offering programs that include content related to using technology for teaching



TEACHERS USING TECHNOLOGY FOR LEARNING

The richest uses of technology are those that engage students in active learning of subject matter that is tied to meaningful learning goals. These vignettes illustrate discipline-specific approaches that NWP teachers have developed in mathematics, reading, and physics.

MIKE McCOMAS

West Virginia community college mathematics instructor

Mike uses spreadsheet software to help students understand the functions of linear and quadratic equations. “Just changing the numbers in the equations, they move the parabola up, or move it down, or spread it out, or push it together. Students can do 10 different equations in a minute because they can manipulate that little program so easily, and they can actually visualize what the math means.” Mike also uses networking software to help his students overcome their fear of communicating about math so that they can study together between class sessions. He teaches his students to use the Internet to find math resources and applications for math knowledge. Mike would use technology more, but there are no computers in his classroom because his campus is under construction.

RENEE WEBSTER

Michigan first grade reading teacher

Renee uses small hand-held digital voice recorders to record her students’ conversations as they participate in “Book Talks” about literature they are reading. She selects examples of her students’ “smart thinking” to share with the class, using their own voices, and she stores the conversations on CDs so parents can listen as well. Renee uses this technology to reveal different understandings among mainstream and special needs students, and to offer special needs students greater access to class participation. This technology also helps Renee bridge the gap between the worlds of her students’ homes, their school, and the stories they read.

SETH GUINAIS-KUPPERMAN

New York City high school science teacher

Seth teaches entry-level physics students who he describes as “literary and not very sciency.” He connects his students to science through their “comfort zone,” which is writing. By attending weekly Tech Thursdays with the NYC Writing Project for almost two years, Seth found the support he needed to use writing with technology that was anchored in science. He has his students select an important physics concept—angular momentum, dynamo theory—then research it and write a Wikipedia-type entry explaining it. He pairs his students with senior Advanced Placement physics students in online exchanges, where they clarify the physics concepts and hone their writing. His students perfect their writing to post it online on a public forum. Seth says this project gives his students the experience of “authorship, research, reading, reporting out to the world about physics concepts and ideas, and also co-authoring and working with other people.”

POLICY IMPLICATIONS

Invest in infrastructures that will build human capital in the teaching force.

Ultimately, it is classroom teachers who will bring new technologies and students together for powerful learning. Infrastructures are needed to:

- Link teachers with universities and other technology- and learning-rich institutions, giving them direct access to 21st century teaching, learning, and workplace uses of technology.
- Build cadres of leading teachers who know both subject matter and technology and can create and hone effective uses of technology in real classrooms with real students.
- Provide teachers new to technology with hands-on experiences using technology themselves in ways that are relevant to their teaching areas.
- Provide teachers with long-term, classroom-centered support so they can develop confidence and skill in integrating technology into their daily work with students.

Fulfill the promise of equity and access for all.

Technologies that are used well in the classroom can do more than level the playing field. They can re-engage students left behind and open up new avenues to academic success and social participation. To fulfill the promise of equity:

- Equip classrooms in poor and underserved communities with technologies for learning that really work, and that engage students’ minds, activate their imaginations, and encourage their dreams.
- Dedicate human capital investments to teachers and leaders in underserved schools.
- Reward schools that make an effort to do the steady work of supporting teachers in the challenging task of learning unfamiliar technologies and gaining the confidence and skill to use them well in their teaching.

DID YOU KNOW?

Employers, parents, and students themselves want digital literacy and better workforce preparation.

- 84% of employers say K–12 schools are not doing a good job of readying students for the workplace. Nearly 40% of high school graduates feel inadequately prepared for college or work.^[1]
- 74% of Americans believe that becoming proficient in computer technology should be a high school graduation requirement, ranking its importance just below that of reading (94%) and writing (84%). Further, 76% of the public think students should learn to use computers at a young age.^[2]
- 87% of all youth between the ages of 12 and 17 use the Internet.^[3] 68% of all teenagers have used the Internet at school, an increase of roughly 45% over the past four years.^[4]

How is the educational system responding?^[5]

- The National Assessment of Educational Progress (NAEP) has determined that students will produce writing on a computer platform at grades 8 and 12 for the 2011 NAEP in Writing.

State technology standards for students:

- 48 states have technology standards for students. Only Iowa, Mississippi, and the District of Columbia currently do not have such standards. 22 states embed technology standards in academic content-area standards.

State assessments in technology:

- 5 states—Arizona, Georgia, North Carolina, Pennsylvania, and Utah—assess student competence on technology standards.

State technology standards for teachers:

- 44 states have technology standards for teachers, and 35 have them for administrators. 19 states tie initial teacher licensure to technology competence; 9 of these states have similar requirements for administrator licensure. 10 states include technology in recertification processes for teachers, 6 do so for administrators, and 4 do so for both teachers and administrators.

Schools wired:

- In 1994, 35% of U.S. public schools had access to the Internet. By 2005, the Internet had penetrated into virtually all elementary and secondary schools.

Classroom access to Internet:

- Only 3% of classrooms had Internet access in 1994. By 2005, 94% of classrooms had access.

Student access to computers:

- On average, 95% of 4th graders have computer access, with the highest levels of access found in West Virginia, at 100%, and the lowest in Hawaii, at 87%. 83% of 8th graders have computer access. 8th grade access is highest in Maine, at 100%, and lowest in the District of Columbia, at 61%.

Ratio of students to computers in schools:

- On average, there are about 4 students to a computer. In Maine and South Dakota, 2 students share one computer on average. In California, Delaware, Mississippi, Rhode Island, and Utah, 5 students share a computer on average.

ABOUT THE NATIONAL WRITING PROJECT

The National Writing Project is the nation's largest and longest-standing professional development infrastructure for teachers. Annually, NWP teacher-consultants—leading teachers who have become experts through research and practice—lead nearly 7,000 programs on university campuses and in schools for nearly 100,000 teachers. NWP programs focus on the teaching of writing as a vital component of literacy and on the uses of writing to learn and to communicate in all subject areas. For more information, see www.nwp.org.

Footnotes

- 1 From Using Technology to Maintain Competitiveness: How to Get Our Groove Back. Geoffrey Fletcher (2006). *T.H.E. Journal*; 33:13, pp 18-21.
- 2 Belden Russonello & Stewart. 2009. *Writing, a National Pastime, Takes New Forms: A National Survey for the National Writing Project*. Washington, DC: Belden Russonello & Stewart.
- 3,4 From Teens and Technology: Youth are Leading the Transition to a Fully Wired and Mobile Nation (2005). Found at http://www.pewInternet.org/pdfs/PIP_Teens_Tech_July2005web.pdf
- 5 Tracking U.S. Trends: States vary in classroom access to computers and in policies concerning school technology. *Education Week* 27:30 (pp 39-42) March 27, 2008. Found at <http://www.edweek.org/ew/articles/2008/03/27/30trends.b27.html>