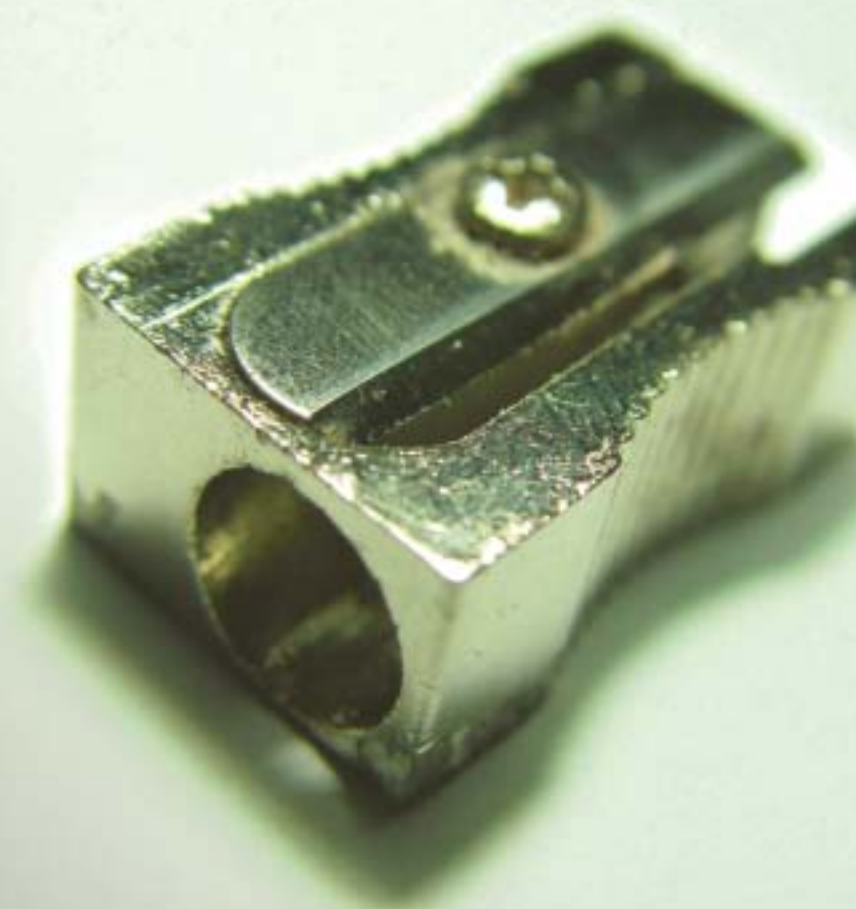


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The Magazine of The Heinz Endowments

SHARPENING OUR SCHOOLS

The Heinz Endowments partners with the Pittsburgh Public Schools, community organizations and other funders to craft new ideas to boost student achievement.



inside

The Heinz Endowments was formed from the Howard Heinz Endowment, established in 1941, and the Vira I. Heinz Endowment, established in 1986. It is the product of a deep family commitment to community and the common good that began with H.J. Heinz, and which continues to this day.

The Endowments is based in Pittsburgh, where we use our region as a laboratory for the development of solutions to challenges that are national in scope. Although the majority of our giving is concentrated within southwestern Pennsylvania, we work wherever necessary, including statewide and nationally, to fulfill our mission.

That mission is to help our region thrive as a whole community—economically, ecologically, educationally and culturally—while advancing the

state of knowledge and practice in the fields in which we work. Our fields of emphasis include philanthropy in general and the disciplines represented by our five grant-making programs: Arts & Culture; Children, Youth & Families; Education; Environment; and Innovation Economy.

In life, Howard Heinz and Vira I. Heinz set high expectations for their philanthropy. Today, the Endowments is committed to doing the same. Our charge is to be diligent, thoughtful and creative in continually working to set new standards of philanthropic excellence. Recognizing that none of our work would be possible without a sound financial base, we also are committed to preserving and enhancing the Endowments' assets through prudent investment management.

h magazine is a publication of The Heinz Endowments. At the Endowments, we are committed to promoting learning in philanthropy and in the specific fields represented by our grant-making programs. As an expression of that commitment, this publication is intended to share information about significant lessons and insights we are deriving from our work.

Editorial Team Linda Bannon, Linda Braund, Donna Evans, Carmen Lee, Douglas Root, Robert Vagt. Design: Landesberg Design

About the cover The shiny silver pencil sharpener represents the efforts of The Heinz Endowments and other Pittsburgh funders to support local school reforms for improving student achievement. These organizations are not attempting to replace the Pittsburgh school district's educational plans, but rather to supplement them with innovative strategies and programs designed to help children learn.

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Wild Things

Balancing healthy state forests and healthy deer populations is no easy task, especially when one tends to feed on the other.



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A Promising Path

As the Pittsburgh Public Schools rolls out reforms in the classroom, the Endowments is working with other funders and community groups on new strategies to help motivate district students to do better in school.



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Robot Economics

Some local foundations are banking on driverless robots not only making car travel safer but also opening up new economic opportunities in southwestern Pennsylvania.

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feedback

Our last issue was a special report that examined how public officials, business leaders and environmental experts in southwestern Pennsylvania are at odds in developing solutions for the region's problems with fine-particle air pollution. The stories included an analysis of the region's air-quality challenges, a look at the political tensions surrounding the issue, a review of the men and women who have worked to clean up the region's air over the past century and suggestions to readers for helping to improve air quality in their communities.



Trouble in the Air

In "Trouble in the Air," Jeff Fraser successfully explains the historical trajectory that has resulted in Pittsburgh's continuing air-quality problems, despite the successes of so many individuals and organizations that have spent decades working to clean up the air in "Smoky City" for current and future residents.

As an avian ecologist who works to protect birds and their habitats, I am struck by the larger-scale impacts that link Pittsburgh to upwind polluters and downwind recipients of the particulate matter from western Pennsylvania smokestacks. A number of studies have now shown that Common Loons, one of our favorite symbols of remote northern wilderness lakes, suffer from the effects of mercury toxicity because they are in locations connected to the Pittsburgh area by weather patterns. Wind carries harmful particulates from regions that include western Pennsylvania and the Ohio River Valley to places such as Nova Scotia, where loons have some of the highest blood levels of mercury measured, high enough to cause poor reproduction and asymmetrical growth of flight feathers.

David Evers of the BioDiversity Research Institute in Maine has begun working in western Pennsylvania's Laurel Highlands on several species of songbirds that live at higher elevations in and around wetland and riparian habitats. The Louisiana Waterthrush is a 6-inch-long bird that is considered to be an indicator of high-quality headwater streams in our area. However, a blood sample from one of these birds from Laurel Ridge had the highest mercury concentration Evers has measured in a bird. Perhaps this species can act as our "canary in the coal mine" to help us monitor environmental mercury in our own backyard as we continue to improve air quality in the Pittsburgh area.

It is exciting that Pennsylvania is taking the lead in substantially reducing mercury emissions from coal-fired power plants, thanks to the hard work of Endowments-supported PennFuture and other advocates. We may still have a long way to go, but every step will improve the quality of life for humans and wildlife alike.

Sarah Sargent
Important Bird Area Coordinator,
Northwestern Pennsylvania
Audubon Pennsylvania
Meadville, Pa.

Polluted Politics

In "Polluted Politics," Carmen Lee and John Altdorfer capture the conflict at the crux of efforts to cut air pollution in the Pittsburgh region and throughout Pennsylvania: Everyone agrees it's a problem, but there's disagreement as to who should be fixing it.

Through our door-to-door and other citizen-outreach efforts, we at PennEnvironment know that people throughout the Pittsburgh region want more, not less, done to cut air pollution. And from Pittsburgh City Council to Congress in Washington, our advocates experience resistance from decision makers who are quick to say that cleaning up the region's air isn't something they can accomplish on their own.

But PennEnvironment's research helps to show why action is needed. In 2006, we released our "Air Pollution & Public Health in Pennsylvania" report, which found that, statewide, "soot" pollution causes roughly 5,000 deaths annually, and air pollution leads to 800,000 missed work days each year.

The good news is that we have the technologies and policies to drastically cut air pollution in the region and throughout the country. Already, improved public

transportation systems and air pollution control technologies for industrial facilities have helped to make the region's air much cleaner and safer than it was decades ago. But still, too many power plants, industrial facilities and vehicles are using outdated technologies that create unnecessary air pollution — pollution that continues to pose a public health threat to the region's citizens.

Yes, pollution from neighboring states plays a role in Pittsburgh's air pollution problems, which is why we need our U.S. representatives and senators pushing for more stringent national air pollution standards. But there's no denying that local facilities like the Clairton Coke Works plant — and the many coal-fired power plants across western Pennsylvania — are also a big part of the problem. There's also no denying that if every level of government waits for another level to act first, our air pollution problems will persist for generations to come.

Nathan Willcox
Energy & Clean Air Advocate
PennEnvironment
Philadelphia, Pa.

Corrections: A new regulation requires Pennsylvania's coal-fired power plants to reduce their mercury emissions by about 3.6 tons of mercury each year. An incorrect amount was reported in the story "Trouble in the Air," published in our last issue.

In the article "Polluted Politics" that also ran in that issue, it was incorrectly reported that former Allegheny Conference on Community Development chief Harold Miller did not include the Liberty Borough monitor in his air-rating system for southwestern Pennsylvania. It was included in his average of monitor readings from the region, but it did not affect the results.

message



Barry Lavery

By Teresa Heinz
Chairman, The Heinz Endowments

The brilliant author-historian David McCullough, a longtime family friend, has been focusing his public speaking in recent years on the sad state of the teaching of history, and by extension, the erosion of quality in our public education system.

“We are raising a generation of Americans that is, by and large, illiterate in history... and woefully undereducated in many other subjects as well,” David, the author of such prize-winning best-sellers as the biographies of John Adams and Harry Truman, said matter-of-factly in a speech in Pittsburgh in April.

That alarm bell rung by David at the Pittsburgh 250 History Makers dinner on the state of teaching and public education couldn't have been more powerful in terms of the messenger or the occasion. Here was a proud son of the city's Point Breeze neighborhood, who began his love of learning in the Pittsburgh Public Schools, making his education-reform plea at a pivotal moment for his hometown.

For years, the Endowments and other local foundations have recognized the serious problems facing our public system: steadily declining enrollment and a significant achievement gap involving students from low-income families, primarily African American, which contributes to substandard test scores and abysmally low graduation rates.

Our Pathways to Educational Excellence team and a group of committed education funders have been working with Pittsburgh Public Schools Superintendent Mark Roosevelt on a comprehensive academic-reform plan. That grant making, reported in detail by Chris O'Toole in this issue's cover story, is made up of \$5 million from the Endowments and \$9 million from other local foundations in direct schools support, as well as another \$6 million from the Endowments for community programs that buttress district reforms.

In the midst of that work, the Pittsburgh Promise was introduced, a bold, innovative program that I helped bring to foundation and community leaders for discussion last October. It would provide college scholarships to all qualifying graduates — as much as \$40,000 over four years when the program is fully operational.

That idea has evolved into an enormous 250th birthday present for Pittsburgh. This is due to the generosity of the

University of Pittsburgh Medical Center, which has granted \$10 million to start the program this year and pledged a challenge grant that would guarantee \$90 million more, provided \$150 million is funded by others.

The most significant facet of this gift is that it presents students an opportunity for higher education that they might never have imagined. The Promise also offers an incentive for families to stay in the city, and may encourage others to move in or move back.

At the Endowments, the package has spurred keen interest and several questions, chief among them being: How do we find a way to participate in the Promise without diluting our capacity to support the basic work of academic reform — ensuring that every city schools graduate meets a recognized standard of learning? Without that assurance, any college grant program, no matter how well funded, is a promise bound to be broken when Promise students are overwhelmed in a college program and drop out.

There are structural concerns, too, about the viability of a fixed Promise endowment, when measured against tuition increases of 5 percent or more each year. There are worries that a “Promise gap” will emerge in a program where students receive a city schools diploma but don't meet the grade-point average to qualify for Promise funding, or where students in lower-income situations might be saddled with a disproportionate amount of debt.

Despite these questions, the program at its core embodies a key principle: No high school graduate with the wits and the will to pursue higher education should be denied for lack of money. We believe we can most effectively make that a reality by supporting those parts of the Promise that are aligned with our current efforts in the areas of academic reform and student-family support.

I leave it to David McCullough, a master of the American experience, to remind those of us involved with grand strategies of school reform that “students, just like teachers, can't love what they don't know.” There can be no greater success without that love — an appreciation for the value of learning and a culture that promotes it.

It is our job as parents and community leaders to provide that culture and a system that reflects it every day. If we do that, I'm convinced that all our other promises will be kept. *h*

Sometimes it takes a careful eye to detect the potential destruction of a forest. But problems become apparent when saplings are irreversibly damaged, like this one that was gnawed by deer in the Allegheny National Forest.



Maintaining Pennsylvania's forests involves more than allowing nature to run its course. Wildlife biologists and others are using science-based methods to manage deer populations and to prevent them from nibbling away at the state forests' future.

by Jeffery Fraser photography by Joshua Franzos

the wild things





Right: Deer have vegetation preferences, as forester Kenneth Kane knows. Kane, who works for Keith Horn Forestry, examines a sturdy, young beech tree, which is able to grow because deer do not like beech.

Below: To the casual observer, deer bounding through the Pennsylvania woods make an appealing scene. But for conservationists, such herds as these can indicate a potential threat to state forests.

crooked tulip poplar pokes through the carpet of snow that covers the floor of a hardwood forest in northwestern Pennsylvania, just below the New York line. It stands no taller than a yard and is as skinny as a man's pinky.

"How old do you think this is?" asks Ken Kane, a forester with the company that manages these woods. Guesses range from one to two years. Kane puts it at seven or eight. "This should be 15 feet tall."

The seedling fails to thrive, he says, because white-tailed deer love the succulent buds of the tulip poplar and eat them like candy. Each time they do, a ridge forms on the stem where the bud was "browsed" or eaten. Those ridges tell Kane that deer have fed on this seedling for nearly a decade. The good news is the terminal bud, the seedling's most recent, hasn't been browsed,



suggesting the intensive management and hunting strategies adopted to reduce the herd and repair the ecosystem of this forest, owned by the Bradford Water Authority, are paying off.

"Ten years ago, I would've gotten more excited over this seedling than a mature tree," says Kane, a forester with Keith Horn Forestry of Kane, Pa. "This shows how far we've come." A few steps away, he finds some raspberry plants, all badly browsed. "We still have a ways to go."

Scientific evidence suggests that the regeneration of trees, particularly species of highly valued hardwoods, is a problem across many of the 16.6 million acres of largely even-aged

public and private forests that cover 58 percent of Pennsylvania. Only half of the U.S. Forest Service study sites in the state have enough seedlings and saplings to replace the existing forest with similar tree composition. The consensus of research on the issue points to over-browsing by a deer herd grown too large for its habitat as the chief reason for a crisis that

threatens the health of forests and the safety of motorists in Pennsylvania, which leads the nation in deer-vehicle collisions. Over-browsing also is hurting the state's timber industry, birds, small mammals and the deer themselves.

While balancing deer populations with forest ecosystems by lengthening hunting seasons and increasing bag limits for antlerless deer may seem, on its face, a simple solution, it has been anything but. The Pennsylvania Game Commission's seven-year-old, science-based approach to deer management remains a subject of sharp controversy, and the results by most accounts have been mixed.



Wildlife biologists, foresters and others who support science-based management of the herd say progress has been made, but the job is not finished. And they voice concern that the game commission—a free-standing agency that depends on revenue from hunting licenses and fees for its survival—may buckle under pressure to increase deer numbers without scientific justification and, in recent months, has shown signs of doing just that.

Applying that pressure are some of the state's deer hunters, an aging population accustomed to spotting plenty of deer from their stands or on short hikes through woods and fields. They argue that the game commission has reduced the herd so drastically that many places they once hunted with success are no longer worth the trip.

“In some areas, they've gotten rid of all the deer,” insists Stephen Mohr, president of Unified Sportsmen of Pennsylvania, which opposes the deer management program with lobbying, petitions and lawsuits. “Some call it deer management, but it's blatantly a deer eradication program.”

Similar controversies have been played out before. Some 50 years ago, Roger Latham, while he was chief of the commission's Wildlife Research Division, warned of over-browsing and urged trimming the doe herd. He was eventually fired for pressing the issue.

More recently, an independent forest certification team found deer over-browsing to be a threat to the future of the

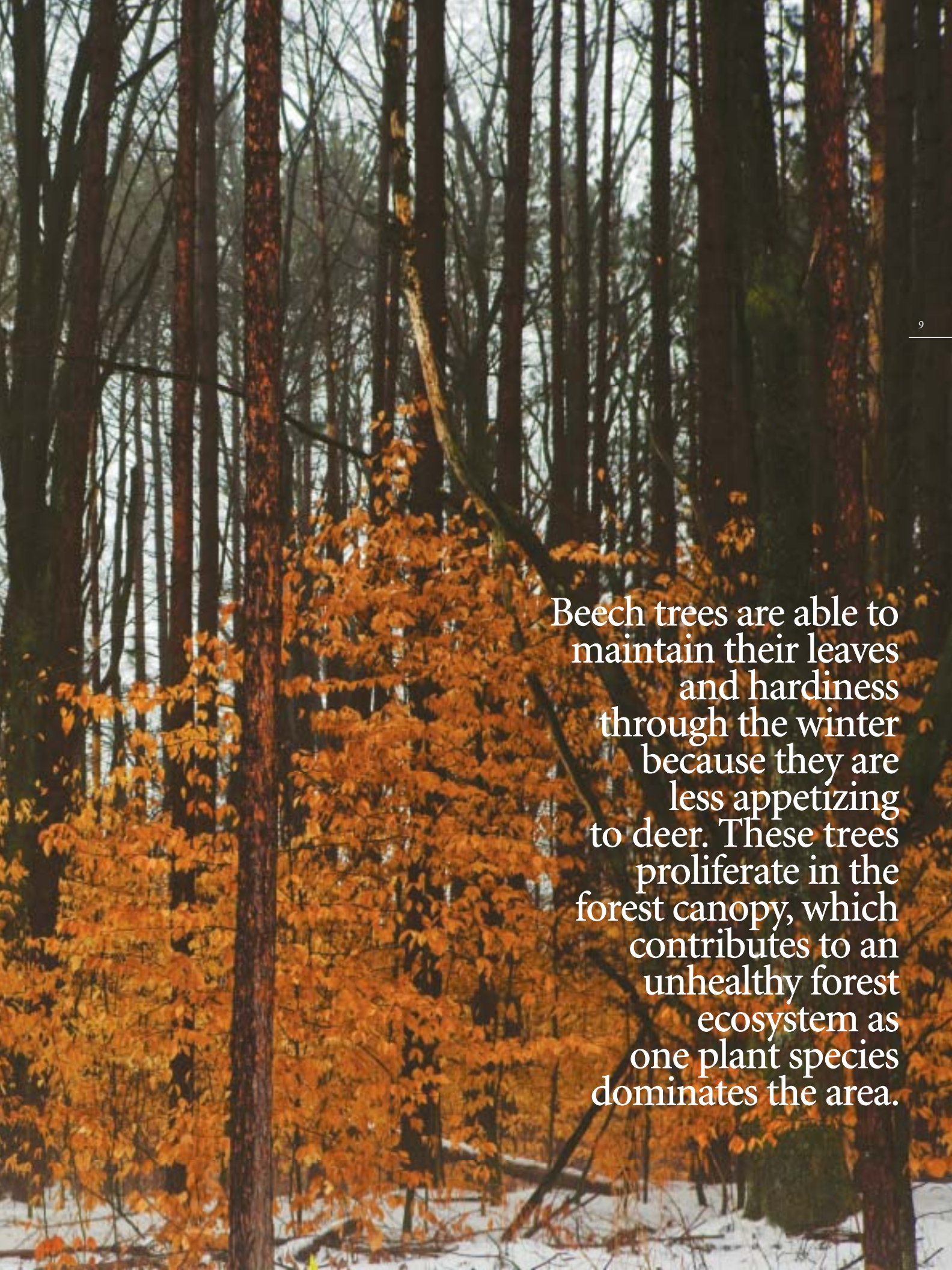
state's 2.5 million acres of public forest and parks. In 2000, with support from The Heinz Endowments, the state forest system was certified as meeting the sustainable forestry standards of the Forest Stewardship Council. But certification came with a warning that immediate steps needed to be taken to reduce deer impacts.

“That's what triggered it for us—that if we don't do something about deer management, we won't continue to have sustainably certified forests and, ultimately, we won't have forests at all,” says Caren Glotfelty, Environment Program director for the Endowments.

Since 2000, the foundation has awarded grants totaling nearly \$500,000 to advance sound deer policy and nurse forest ecosystems back to health. This support included grants to Audubon Pennsylvania to develop deer-management strategies, analyze deer impact and report its findings. A grant to the Wisconsin-based Sand County Foundation lent support to the Kinzua Quality Deer Cooperative, a 74,000-acre deer-management experiment that includes the Bradford Water Authority forest managed by Kane. Other grants supported efforts to increase public understanding of deer, their impact and the need to manage them wisely.

“It's a complex ecological issue,” says Glotfelty. “The questions have been: How do you get people to understand it? How do you get people with polarized points of view to appreciate the idea of the hunter as a problem-solver in ecosystem management?”





Beech trees are able to maintain their leaves and hardiness through the winter because they are less appetizing to deer. These trees proliferate in the forest canopy, which contributes to an unhealthy forest ecosystem as one plant species dominates the area.



A lack of tree seedlings prevents forests from regenerating. Deer over-browsing, competition from other plants, disease and acid deposited in the soil from air

pollution all play a role. Most studies put much of the blame on deer that eat plant species they find tasty, such as tulip poplar and oak, but not species such as striped maple, American beech and fern. When deer herds are too large, few preferred seedlings survive, forest diversity is crippled and the understory is changed in ways that discourage the regrowth of many kinds of trees.

“Where deer impact is sustained at very high levels, plants that are not preferred by deer take a dominant place in the landscape,” says Susan Stout, a researcher at the U.S. Forest Service northeastern station. “In some areas, you can drive for miles and see through the forest for a great distance, and there is this lovely carpet of hay-scented fern. Deer won’t touch hay-scented fern. But so little light penetrates that ground-layer fern canopy that many seedlings won’t grow through it.”

If the lack of regeneration among half of the high-canopy tree species across Pennsylvania isn’t alarming enough, U.S. Forest Service research paints a more troubling picture for the state’s \$5.5 billion-a-year timber industry. Only one-third of the forests are showing conditions adequate to replace commercially desirable timber species. And if state forests lose their Forest Stewardship Council certification, it would rob the industry of rapidly growing markets for environmentally friendly products, particularly in Europe.

“The certifiers were clear,” says Blaine Puller, forest manager of Kane Hardwood. “They said something has to be done about the deer problem to say forests in Pennsylvania are sustainably managed.”

Several bird species also are in trouble because of the lack of food and cover. In fact, over-browsing is the largest single threat to bird habitat after urban sprawl, says Timothy Schaeffer, executive director of Audubon Pennsylvania. Wood thrush, which nest in the scrubby forest understory, have declined 67 percent in Pennsylvania since 1967. The golden-winged warbler, which prefers dense shrubs and saplings, is down 98 percent.

Over-browsed habitat is blamed for contributing to a 22 percent decline in ruffed grouse, the official state bird.

A high-density deer population has human impacts as well. Surveys by State Farm Insurance routinely have Pennsylvania leading the nation in deer-vehicle collisions, based on industry claims data. Last year, Pennsylvania topped State Farm’s survey with 98,313 deer-related collisions reported.

And Lyme disease, caused by the bite of blacklegged ticks that prefer deer as hosts, is a growing problem in the state. Rates increased from 22.2 cases per 100,000 people in 2001 to 34.5 cases per 100,000 people in 2005, according to the Centers for Disease Control.

One challenge deer managers face is that Pennsylvania’s estimated 1.5 million deer are not equally distributed across the state. High-density areas today include cities and suburbs, where deer thrive on food in parks and gardens, are protected by laws that prohibit hunting, and have become a nuisance and a health and safety problem.

High numbers of deer in Pittsburgh’s Mount Washington neighborhood and complaints of illegal hunting have for the first time raised deer management as an issue for city government. With deer-motorist collisions at record highs, Mt. Lebanon last year joined a growing list of suburban communities with deer-management plans by hiring U.S. Department of Agriculture marksmen to harvest deer at night. The first shoot killed 69 deer, and officials authorized more hunts to harvest another 150.

The most significant step taken to address deer abundance throughout the state was the shift in game commission management strategy to a science-based approach that manipulates hunting opportunities, including seasons and bag limits. The goal is to balance the herd across 22 wildlife management units based on evidence of forest health, deer health and deer-human conflict in each. A two-week concurrent buck and antlerless season was initiated to promote the harvesting of doe—a key to



Far left: Like a diligent detective, Susan Stout, a research project leader with the U.S. Department of Agriculture Forest Service, points to evidence of deer browsing.

Left: Deer also find food to their liking in the parks and gardens of Pennsylvania's cities and suburbs. This buck wandered through a residential section of Bethel Park, a suburb south of Pittsburgh.

reducing herds. And the Deer Management Assistance Program was created to allow landowners with over-

browsing problems to receive additional antlerless permits so that hunters can kill more doe on their property.

This was a seismic change for a commission born in the wake of widespread clear-cutting that left much of the forest land barren of trees and unrestrained market hunting that decimated the deer population to a few hundred head a century ago. For much of its history, the commission managed deer to achieve high population densities by curbing or prohibiting doe hunting, offering bounties for natural predators and other methods.

Progress under the new approach, adopted around 2000, is difficult to measure at the moment, says Christopher Rosenberry, supervisor of the game commission's Deer Management Section. Much of the data needed to assess its impact on habitat health is still being developed. "I don't expect we'll see tremendous changes in a relatively short period of time. Some people might not like that, but forest habitat health and deer health don't change on our schedules."

Pennsylvania hunters are divided on the issue.

The Pennsylvania Federation of Sportsmen's Clubs, the largest in the state, "strongly supports scientific deer management," says Rocco Ali, its president. "To have deer, you have to take care of their habitat."

The Unified Sportsmen of Pennsylvania, however, has gone to court to challenge the science behind the deer program. "If we had to label it right now, we'd have to say the Pennsylvania deer management program is based on voodoo science—there's no factual science supporting it," contends Mohr. And in Harrisburg, state Sen. Mike Folmer, R-Lebanon, recently called for an audit of the program, saying he constantly hears hunters complain that the deer herd is too thin.

Wildlife biologist Bryon Shissler says hunters may not see deer because there are fewer deer in some areas; deer may retreat deeper into the woods; and some hunters fail to adapt to the challenges of hunting a more balanced population. Hunter and deer behavior studies suggest Pennsylvania hunters, on average,

venture less than three-tenths of a mile from a road, and deer that range beyond that have little chance of being harvested.

"Those of us who grew up when deer were managed at very high densities grew up with a skill set that said you go into the woods, sit down and the deer will come to you," Shissler says. "Under these new conditions, being locked into those old expectations and that old skill set doesn't serve you well."

But there's a risk that steady complaints of deer shortages might influence a game commission that relies on hunters for more than half of its non-tax revenue, he adds, and one example may be last year's decision to reduce doe season in four wildlife units from 12 to 7 days and to include forests where the habitat is among the poorest.

Rosenberry says that recommendation "was not one that originated with the deer section. It's no secret we prefer to keep things as stable and consistent as possible."

Further complicating the process, the Game Commission reported in March that hunters killed 323,070 deer statewide during the 2007–08 season—11 percent fewer than in 2006–07. The reasons for the decline and the impact it might have on the deer management program had not been determined.

Meanwhile, up in Ken Kane's neck of the woods, the Kinzua Quality Deer Cooperative is showing what science, the right tools, and foresters and hunters working in partnership can do to turn around a habitat.

The deer herd was cut in half in seven years using hunter outreach, education, thousands of the Deer Management Assistance Program's antlerless permits and other measures. Browsing is down. Vegetation growth and forest diversity are up. More food and cover are available for deer, grouse, songbirds and other wildlife.


Seedlings are surviving, including preferred species such as red maple and hemlock. The average weight of buck and doe is markedly higher. Antler spread and the number of points are up. Hunters report seeing 10 to 12 deer per outing.

And even last year, when the deer herd was at its leanest, 94 percent of hunters said they'll be back next season. *h*



PROMISING PATH

PITTSBURGH IS ABUZZ OVER PLANS TO OFFER HUNDREDS OF CITY PUBLIC SCHOOL STUDENTS A FINANCIAL LAUNCHING PAD TO HIGHER EDUCATION. BUT SEVERAL LOCAL FOUNDATIONS ARE STRUGGLING TO BALANCE THEIR PARTICIPATION IN THE NEW PITTSBURGH PROMISE INITIATIVE AGAINST THE MILLIONS ALREADY INVESTED IN THE SCHOOL SYSTEM'S TWO-YEAR-OLD REFORMS, AMONG THE BOLDEST OF ANY URBAN DISTRICT IN THE COUNTRY. HERE'S A REPORT ON THE KINDERGARTEN CLUB MOMS, THE AFTER-SCHOOL WIZARDS, THE ART TEACHERS-TURNED-CULTURAL GUIDES—EVEN A FROG NAMED READY FREDDY. BY CHRISTINE H. O'TOOLE PHOTOGRAPHY BY JOSHUA FRANZOS



Lenell Hale is a veteran 33-year-old teacher with a warm smile, a two-way radio to check in with colleagues and a patient ear for parents at Northview Accelerated Learning Academy. Since last fall, he's been a parent and community engagement specialist at the elementary school, helping families understand new expectations in the Pittsburgh district.

“To be realistic, about 30 percent of our families see the vision. They know what we want to achieve,” he says. “To the other 70 percent, [the changes are] a bucking bronco.”

Pittsburgh families, teachers and administrators aren't the only ones hanging onto their saddles. Two years into a reform effort that's been wrenching in many ways, foundations and community leaders are far too committed to dismount now.

The Endowments has tried to buttress recent reforms by awarding about \$5 million to the Pittsburgh Public Schools and nearly \$6 million to other programs that aid district children. Other local philanthropies have made more than \$9 million in grants to the city schools. That group includes the Grable, Pittsburgh, Buhl, Claude Worthington Benedum and Jewish Healthcare foundations, which along with the Endowments have channeled a portion of this funding through a joint Fund for Excellence. The foundations are holding tight, betting that patient capital and community support will turn the district into a thoroughbred.

“Our grant making reveals support for reform efforts that ultimately will benefit kids in the Pittsburgh Public School system,” says Gregg Behr, executive director of the Grable Foundation, defining its \$2 million commitment to programs in the city.

The 2006–07 school year was a rough ride. In the first major strides for Superintendent Mark Roosevelt’s new plan, 22 failing schools in Pittsburgh’s shrinking school district were closed. New “accelerated learning academies,” with curriculum innovations intended to boost the performance of children in pre-kindergarten through fifth grade, replaced traditional schools in tough neighborhoods like Northview Heights.

Huge middle schools were divided into smaller ones. New curricula for every school level landed on teachers’ desks. And a plan, the Pittsburgh Promise, which would provide scholarships to all district graduates with solid grades, was introduced, though a funding pledge to make the program possible didn’t come through until December. (See “More than a promise” sidebar on page 18.) By the end of the year, the needle had notched up, ever so slightly, on standardized test results.

That school year also marked when the Endowments seized an opportunity to leverage support for the district’s newly stated priorities.

Drawing on four of five program areas—Education, Arts & Culture, Innovation Economy, and Children, Youth & Families—foundation staff crafted an initiative dubbed Pathways to Educational Excellence. The effort focuses grant support on school and out-of-school programs, community resources and parent engagement to promote student achievement in school and life. From kindergarten clubs that get families ready to start school to arts education that responds to the black experience, from transforming high school instruction to galvanizing community attention, the initiative aligns with the district’s reform strategy, but doesn’t direct it.

When Endowments staff members approached Roosevelt two years ago with

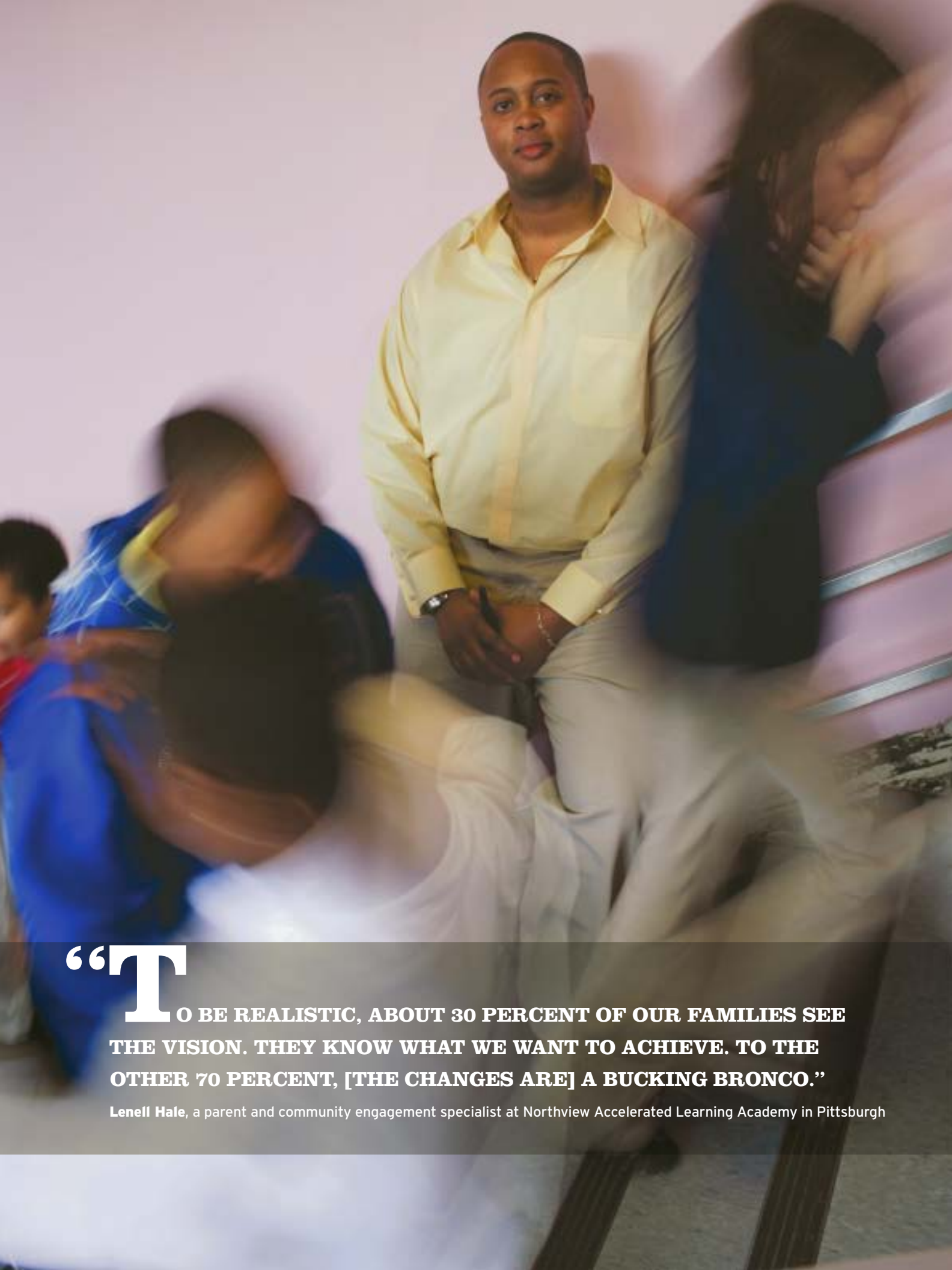
an offer to support his reforms, he told them that the district didn’t have the capacity to fill in some of the fundamental gaps many of the students have, gaps similar to those found in most urban communities. He was impressed by the Endowments’ plans to address some of those needs through the Pathways initiative so that the district’s work in the schools would be more successful.

“That’s very unusual,” he says. “They were thinking through how all kinds of community groups—support groups, mental health groups—could coordinate their efforts in a more systemic approach.”

Sustaining a good relationship between school district and foundation staff requires a delicate balance with carefully defined rules of engagement.

“Our one-on-one meetings made us realize that we needed a closer ongoing collaboration with the senior leaders of the district,” says Marge Petruska, senior director of the Endowments’ Children, Youth & Families Program and chair of the Pathways initiative. “They vetted the Pathways goals and strategies, and we worked out the mechanics—how often we should meet with them, the real nitty-gritty.”

Through the Fund for Excellence, Pathways supports district priorities like the establishment of the accelerated learning academies, leadership training and school redesign. Separate from the



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Lenell Hale, a parent and community engagement specialist at Northview Accelerated Learning Academy in Pittsburgh



“**T**

HE KIDS LEARNED HOW TO INTERACT WITH OTHER KIDS, HOW TO ENJOY EACH OTHER’S COMPANY AND HOW TO RESPECT EACH OTHER. THE PARENTS DID TOO.”

Camellia Nelson, shown with her 4-year-old son, Trevon Johnson, at the K-Club in the Northview Heights Family Support Center, where both are members

fund, Pathways also advances “complementary learning,” a new name for the oft-repeated adage that it takes a village to raise a child. The concept, developed by the Harvard Family Research Project, advocates deliberate, effective links among schools, opportunities for family engagement, early childhood programs, recreation, mentoring, arts, and health and social services. Omaha, Cincinnati and New York are among cities adopting the strategy.

Heather Weiss, the founder and director of the Harvard Family Research Project, helped the Endowments draft its new initiative and flesh out the complementary learning aspect.

“The framework is based on the recognition that interventions are spotty,” she explains. “The piecemeal approach is not getting us where we want to go—we find the gains don’t last. What we are learning is that we must have early continuous intervention. We are saying you need an array of supports, particularly for low-income families. The evidence is strong for the components, but we are just beginning to develop the links across time. In the next five to 10 years, the challenge is to test the concept.”

A strong evaluation component built into the Pathways initiative will help build a national research database.

“Complementary learning needs to be in everything we do,” says Roosevelt.

MEASURING SUCCESS

In 2002, when the Mayor’s Commission on Public Education recommended the formation of an independent oversight group to review the Pittsburgh school district’s performance and push for school improvement, the Endowments stepped in to support the new watchdog, A+ Schools.

“At the time, there wasn’t any public voice focused on improving quality,” notes Joe Dominic, director of the Endowments’ Education Program. “A+ pays attention to strategies, outcomes and the quality of change, and keeps citizens informed.”

Since 2001, there’s been no dearth of school performance data. School report cards are mandated by No Child Left Behind, examining student performance by grade level, race and family income status. A+ Schools has refined the statistics in school-by-school listings published annually.

“You could say it’s the silver lining of [the federal No Child Left Behind Act],” notes A+ Executive Director Carey Harris. “It’s shown a light on disparities in education and has given the public a mandate for demanding student achievement.”

In its third year of community reporting, the group mailed a copy of the full report to all parents in the district and inserted it into a Sunday edition of the Pittsburgh Post-Gazette, with a circulation of 332,000. It’s also turning attention to the next school board elections, when five seats will be opened on the nine-member group.



“For kids who show signs of losing their way, we need to provide a portal. We want to connect them to something positive, and use that connection to convey academic content.”

Is complementary learning the educational buzzword *du jour*, or an organizing principle for real reform? Roosevelt acknowledges that adopting a relatively untested concept could be viewed as a risk for the district. “What we are doing is traditional, aggressive urban school reform. This piece [complementary learning] is different. It’s cutting edge. But risk implies to me that harm might be done, and I have trouble conceiving that is the case here.”

Building Bridges

When Roosevelt assumed the helm at the Pittsburgh Public Schools in 2005, he faced a student-demographic minefield in which 69.2 percent of the district’s black 11th-graders—compared with 28.4 percent of their white peers—failed to crack the proficiency barrier in reading. Nearly 83 percent of the African-American high school juniors—compared with 41 percent of white students in the same grade—missed the proficiency mark in math. And more than 60 percent of the district’s 29,000 students were black. Closing the racial achievement gap was a clear priority not just for the district, but for the city as a whole.

MORE THAN A PROMISE

It's a 14-karat carrot: a public scholarship program that guarantees qualifying graduates money for higher education. The Pittsburgh Promise, introduced to Pittsburgh two years ago, mimed programs in several cities that deliver thousands of dollars in tuition money.

The Promise program will give members of the Class of 2008 up to \$5,000 each year for up to four years. By 2012, the annual award will rise to \$10,000 per year at 100 schools: regional community colleges, the state university system, some private Pittsburgh universities and some vocational schools.

The program gives students a reason to stay in school, and their parents a reason to stay in the school district. Compared with other U.S. cities, the percentage of college graduates in the Pittsburgh workforce is low—just 23 percent. Only 62 percent of the school district's students graduate on time, compared with a 74 percent average across Pennsylvania and 70 percent nationally. The school district's enrollment has tumbled by 10,000 students in just seven years, and projections suggest that it could plummet to 22,000 by 2014.

"We are facing a potentially catastrophic population decline that, absent some bold stroke, will impoverish not only the city but the school system and the urban core for the entire region," says Grant Oliphant, president and CEO of the Pittsburgh Foundation, which will oversee a seven-person board for the scholarship fund. The Promise, adds Oliphant, formerly vice president of programs and planning at The Heinz Endowments, "provides an immediate incentive for parents to stay in the district and stay engaged."

The oldest citywide scholarship plan, the two-year-old Kalamazoo Promise, cites encouraging early results. Since 2006, enrollment in the school system has increased by more than 1,000 students. Eighty-three percent of eligible seniors are using Promise money for college, and real estate values in that city have risen significantly compared with those in the region and the state.

Pittsburgh's initial response to the Promise concept announced by Mayor Luke Ravenstahl and school Superintendent Mark Roosevelt was tepid. The Promise fund didn't become viable until December, when the University of Pittsburgh Medical Center offered \$10 million toward scholarships for the Class of 2008, with an additional \$90 million offered in the form of a challenge grant to motivate other donors.

To date, no donors have stepped up to match UPMC's commitment. But Pittsburgh foundations, especially those already funding primary and secondary education, realize that their participation is crucial to the Promise's funding plan.

"The Promise is another bright star in the constellation of school reform presented by Mark and his team," says Endowments President Bobby Vagt. "It is the logical

consequence of—and can be effective only as the result of—the other pieces of this agenda. Our challenge is to find a way to contribute to the Promise, but not at the expense of our support for the reform program commitments of our Pathways group."

Parents are asking questions, too. Pointing to gaping disparities in academic achievement, they say the district hasn't acknowledged the enormity of the task ahead: making failing students into college scholars.

"The Promise will motivate students who are already headed for college or the fence-sitters—those who would like to go," says Marilyn Barnett, a city parent and educator who chairs the education committee of the local NAACP chapter. "But I spent 30 years with the Pittsburgh Public Schools, and I saw the differences in access to educational opportunity. The majority of students don't have access to counselors and support. I would hope that, first, Pittsburgh could level the playing field. When that happens, the Promise will be able to be fulfilled."

Another city parent sees hurdles for families that can't navigate the college admission process. "How do you apply for [federal] financial aid if you don't have access to a computer?" asks Ronell Guy, executive director of Northside Coalition for Fair Housing.

Guy also wants details on how students' conduct will affect their eligibility. "I am really concerned that people look at this broadly and don't exclude kids who deserve this amazing opportunity."

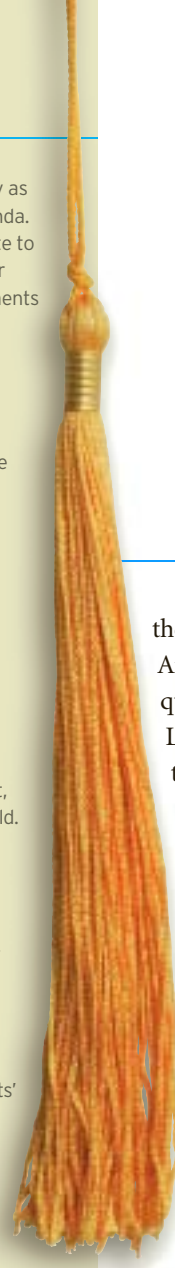
School board member Randall Taylor strongly supports the program but echoes those concerns. "It's a great opportunity for this city, particularly for African-American families...But I think a lot of African-American children are going to be left out unless there's a special coordinated effort to make it real for African-American families. We have to work to make sure there's not a 'Promise gap.'"

District officials have pledged to make students "Promise ready."

"We are going to have to do more of almost everything," acknowledges Roosevelt. He envisions examining sixth-graders' "trajectories" to make sure students are kept on track for high school, advanced placement courses and career planning.

And others in Pittsburgh are hailing the program for the opportunities it offers.

"There isn't anything wrong with the Pittsburgh Promise," says Steve MacIsaac, executive director of the community group Wireless Neighborhoods. "It's easy to look at things in infancy and point out gaps. This is of the single most generous acts of kindness I've ever seen. It's good for the city at every level, and it gives community partners something to rally around. It's going to take all of us."



At Northview, 97 percent of the school's enrollment is African American. The same percentage qualifies for lunch subsidies.

Last year, 35 percent of the school's third-graders scored at proficient or advanced levels in reading, compared with a district average of 59 percent.

The district's strategic plan, adopted in May 2006, emphasized third-grade reading instruction as crucial to future learning. The ambitious plan also called for five new early childhood education centers in the district to spur reading readiness.

The focus on reading provides a glimpse of how complementary learning can work in the Northview Heights community.

National research has documented how strong, stable families influence student success, even in the first year. While nearly half of all children struggle with the emotional and academic demands of kindergarten, children in poverty are particularly at risk. Their parents are less likely to be involved with their schooling, and behavior and academic problems may persist.

To help address such problems in communities like Northview, staff at the University of Pittsburgh's Office of Child Development stepped in, and with the support of a \$650,000 Pathways grant, developed a school readiness project with city school officials. The office has been a



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CHOOL DISTRICT OFFICIALS LAID OUT THE BIG CHALLENGES: GET CHILDREN READY TO ATTEND SCHOOL, GET THEM ENROLLED IN SCHOOL, GET THEM TO SCHOOL EVERY DAY AND GET THEM TO SCHOOL ON TIME. KINDERGARTEN ATTENDANCE IS A BIG PREDICTOR OF LONG-TERM SUCCESS.”

Laurie Mulvey, director of demonstration programs for the University of Pittsburgh's Office of Child Development



“CULTURALLY RESPONSIVE EDUCATION IS A GOOD START. IT’S A VERY IMPORTANT PART OF THE SOLUTION. BUT I ASK, WHY DID IT TAKE THEM SO LONG? AFRICAN AMERICANS HAVE BEEN IGNORED. IT’S NOT A NEW ISSUE.”

Wanda Henderson, a member the Advocates for African American Students in Pittsburgh Public Schools, shown here after speaking to some local grandparents about the responsibilities they face in having to raise their grandchildren

longtime grantee of the Endowments, providing technical assistance for family support and early education programs.

“They laid out the big challenges: get children ready to attend school, get them enrolled in school, get them to school every day and get them to school on time,” says Laurie Mulvey, director of demonstration programs for the Office of Child Development. “Kindergarten attendance is a big predictor of long-term success.”

Mulvey’s staff embarked on a program that adopted the school district’s own kindergarten checklist and a mascot: a green frog named Ready Freddy. The pilots would be placed in two family support centers that serve neighborhoods near accelerated learning academies: one at Northview and one in Pittsburgh’s Hill District. But before the child development workers could offer school-readiness activities, they first had to find the children.

“We knocked on 234 doors around Northview,” recounts Ken Leistico, who coordinated the project and wrote its first curriculum. Sometimes families wouldn’t let the Pitt staff members in. Other times, they got through the door but were still viewed with suspicion. “But when we said ‘kindergarten,’ there were usually big smiles.”

Families got school registration information for older children, listings of local family resources and invitations for 4-year-olds to attend six-week kindergarten clubs with their parents.

Ten families out of about 50 deemed eligible from the canvassing joined “K Club” at the Northview Heights Family Support Center last spring. Among them were Camellia Nelson and her 4-year-old son, Trevon Johnson.

Nelson worried that her son didn’t spend enough time with other pre-schoolers. The two-hour club meetings mixed family time with brief separations. As a result, “the kids learned how to interact with other kids, how to enjoy each other’s company and how to respect each other,” recalls Nelson. “The parents did too.” Trevon demanded extra “homework”—family crafts, books and learning activities—to take home.

With that momentum, the pair enrolled in Raising Readers at the family support center. The family literacy program sponsored by Beginning With Books, another Endowments grantee, provided parent training at the center, more books for the Nelsons’ home library and long-term support for the school district’s reading priorities. Nelson joined a parents’ book club at the family center, and Trevon enrolled in kindergarten in the fall. Although transportation is a problem—the family struggles with the two bus rides required to reach Trevon’s new school—his mother knows attendance is important.

Up the road, Northview Academy teacher Lenell Hale asked Beginning With Books to provide programs for Black History Month celebrations at his school. “The choices were terrific.

The illustrations alone would blow you away,” he recalls. As the school launched a reading drive, he invited fathers to participate in a read-a-thon.

Hale shared his ideas with Bethany House Ministries, which operates an after-school program attended by many Northview students. “We need to create a model. We have the same goal, and we should all be pushing the same message,” he says. Bethany’s after-school group provided the entertainment for the Northview holiday celebration: an African drumming presentation that earned enthusiastic applause. “The rhythm of the drums really riveted the kids.”

Improving Community Connections

A Pathways grant of \$500,000 to the school district will introduce more African- and African-American-centered arts into the curriculum. The Culturally Responsive Arts Education grant will fund demonstration projects that match three or four schools to teams of black teaching artists, whose creative vision involves the sharing of the culture and history of the African Diaspora.

The initiative will “employ arts of the African Diaspora as one strategy to engage and empower African-American children and their families,” explains Endowments Program Officer Justin Laing, a member of the Pathways team. “Our goal is to offer the community additional models to facilitate the achievement of African-American children and demonstrate that the arts

can be very useful in the larger discussion of education reform.”

The grant also comes at a time when the Endowments is considering ways to support an agreement brokered by the Pennsylvania Human Relations Commission between the district and a group called the Advocates for African American Students in Pittsburgh Public Schools. The Advocates is an organization of parents and former parents who sued the school district in 1992, alleging discrimination against black students. After 15 years, the state Human Relations Commission credited the allegations and said the district had to address the concerns.

“Culturally responsive education is a good start. It’s a very important part of the solution. But I ask, why did it take them so long?” asks Wanda Henderson, an Advocates member. “African Americans have been ignored. It’s not a new issue.”

Health education and wellness programs have been supported by the Endowments within the district for several years. Programs like Healthy Class 2010 and Girls on the Run have encouraged middle-schoolers to pay attention to nutrition and exercise. Now the Pathways initiative will be the source of most of the foundation’s health-related support to the city district, such as a \$150,000 grant to introduce yoga classes. To more rigorously address physical and mental health, the Endowments also has commissioned a RAND Corp. analysis of health and wellness activities in the Pittsburgh schools and the community.

The long-term forecast for the Pittsburgh schools: more change.

New models for upper-level instruction include proposals for four new themed schools containing grades six to 12, an international baccalaureate school, a university-partnership school in the Hill District, a science high school, and a merger of the magnet middle-grade and high school creative arts program.

Community and parent buy-in will have a major impact on the success of these projects, but cultivating that support has not been easy.

Celeste Taylor is a board member for A+ Schools, a local advocacy group, and state coordinator for the People for the American Way Foundation, a national civil liberties organization. She’s also the mother of twin sons who will spend their senior year in a building that had been a middle school. She believes that the district’s reform efforts hit a major speed bump with the handling of the closing of her sons’ high school. Despite a new parent-outreach policy, Taylor contends that district officials did not listen to many parent concerns about the changes, pointing to a difference between policy and practice.

“I am a big supporter of public schools . . . I don’t want to be an adversary. I want school board members and the superintendent and teachers and everybody to be [my children’s] advocate,” she says, but quickly adds that schools still need parental involvement to more effectively educate children.

Pathways team members agree,

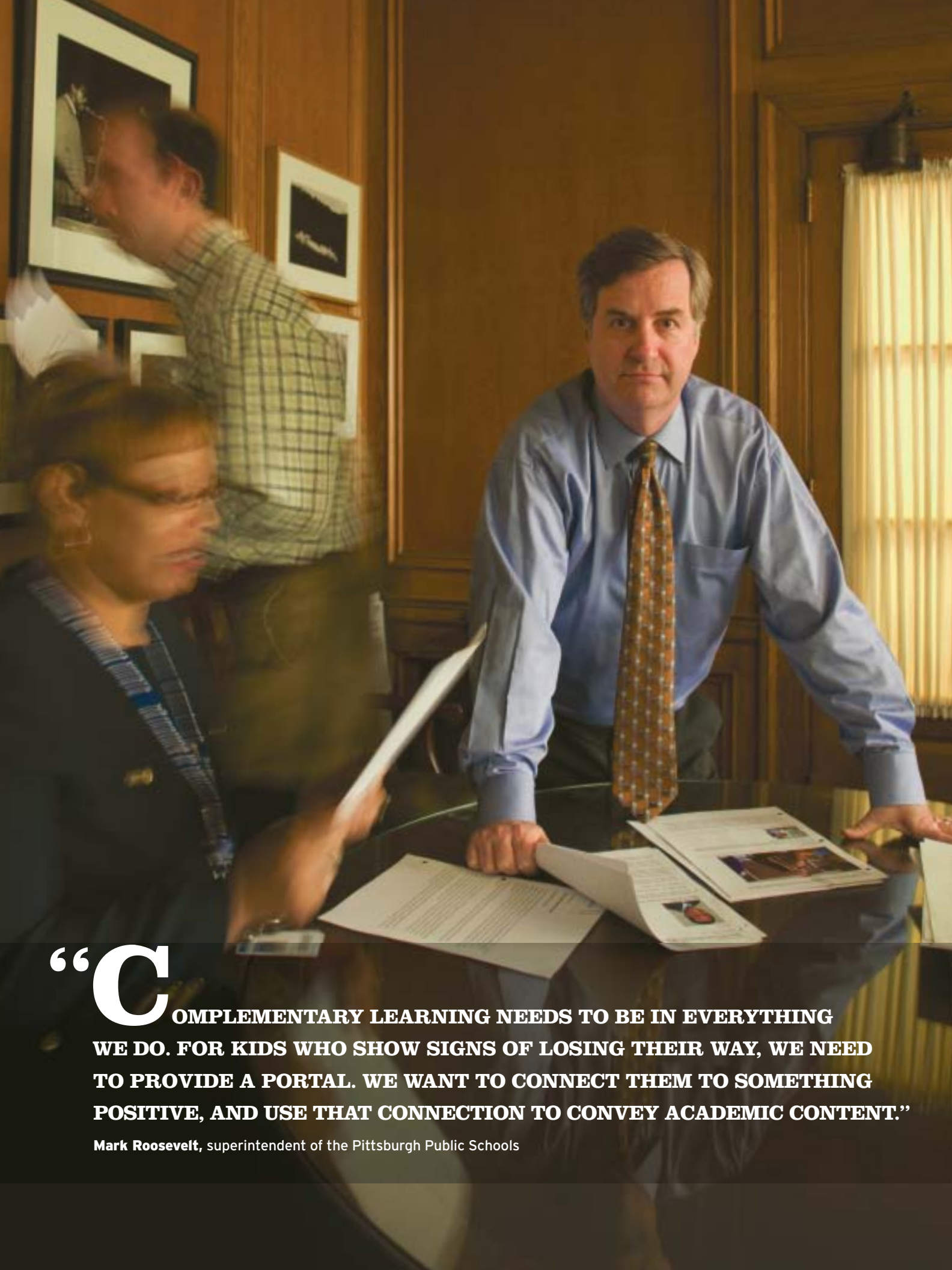
which is why parent engagement is a top priority in the initiative’s strategy, says Petruska. Through the initiative, the Endowments has awarded grants to the district totaling \$320,000 to help stimulate more family involvement.

One grant, for example, supported a new district-wide Welcome Back to School Program. Before the beginning of this school year, a variety of informative, fun, family-focused back-to-school events took place. And for the first time ever, Pittsburgh Public School families were given a neighborhood community resource guide with information about after-school programs and other community resources and activities designed to inspire, educate and entertain their children.

Another grant will help the district inform families about the Pittsburgh Promise—what it holds for them and how they can ensure that their children are prepared to take advantage of the opportunity to secure funding for college or other post-secondary school.

Future funding plans through the Pathways initiative include support for developing a pre-kindergarten mathematics curriculum, restructuring the district’s only Montessori program and creating an after-school department.

“We recognize that school reform is complicated and challenging,” says Petruska. “But it’s an investment we’re making that can reap dividends that will last for generations to come.” *h*



“COMPLEMENTARY LEARNING NEEDS TO BE IN EVERYTHING WE DO. FOR KIDS WHO SHOW SIGNS OF LOSING THEIR WAY, WE NEED TO PROVIDE A PORTAL. WE WANT TO CONNECT THEM TO SOMETHING POSITIVE, AND USE THAT CONNECTION TO CONVEY ACADEMIC CONTENT.”

Mark Roosevelt, superintendent of the Pittsburgh Public Schools

ROOB

The Boss robot developed by Carnegie Mellon's Tartan Racing team is dominating the automated driving landscape.

OT ECONOMICS

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CARNEGIE MELLON UNIVERSITY TOOK THE TOP PRIZE IN LAST FALL'S DRIVERLESS ROBOT COMPETITION; NOW NATIONAL CORPORATIONS AND LOCAL FOUNDATIONS WANT TO APPLY THE NEW TECHNOLOGY IN WAYS THAT WILL MAKE DRIVING AND OTHER TASKS SAFER WHILE EXPANDING ECONOMIC OPPORTUNITIES IN THE PITTSBURGH REGION.

BY CARMEN J. LEE AND C. D. JOHNSON PHOTOS BY TARTAN RACING



n Pittsburgh's South Side, there's an old locomotive roundhouse — a hodgepodge of brick, wood and sheetmetal that's weathered and discolored with age — where two SUVs sit loaded with enough technology to catapult the evolution of the car to levels only dreamed of not too long ago.

The 2007 Chevy Tahoes — each dubbed “Boss” — look like racing contenders with large sponsor logos emblazoned on their two-toned, black-and-blue exteriors. But the real action takes place in the elaborate network of software and hardware that stretches from a bank of computers in the rear of the vehicles to control monitors at the front and in the high-tech sensors strategically attached to various places on the bodies.

Using lasers, radar and global positioning systems, the two SUVs drive themselves with such precision that the Carnegie Mellon University team responsible for transforming them into driverless robots won the \$2 million first prize at the Urban Challenge Robotics Competition in November. The race across a 52.8-mile cityscape course in Victorville, Calif., was sponsored by the Pentagon's Defense Advanced Research Project Agency, or DARPA.

Yet winning the money — and a large trophy in the form of a bald eagle that looks ready to swoop on its prey — was just the first step of the challenge. Next is taking the technology from the roundhouse-turned-robotics lab to the mainstream of 21st century American life. “Maybe 30 to 40 years from now, it will be considered quaint to have a steering wheel in a car,” says Chris Urmson, director of technology for Carnegie Mellon's “Tartan Racing” program.

From increasing mobility independence for the elderly and disabled to replacing the need for human workers on “dull, dirty or dangerous” jobs to making land travel safer and more convenient for the average person, the applications of robotics technology are numerous.

“If there was a push to get a good [research and development] program running and with solid funding available, the commercialization of some of this technology would be only about a decade off,” Urmson notes.

Several Pittsburgh-area philanthropies, including The Heinz Endowments and the Richard King Mellon, Hillman and Benedum foundations, joined corporate sponsors in supporting work to move closer to that goal and to unleash the technology's enormous potential to be a catalyst for economic growth in the city and western Pennsylvania.

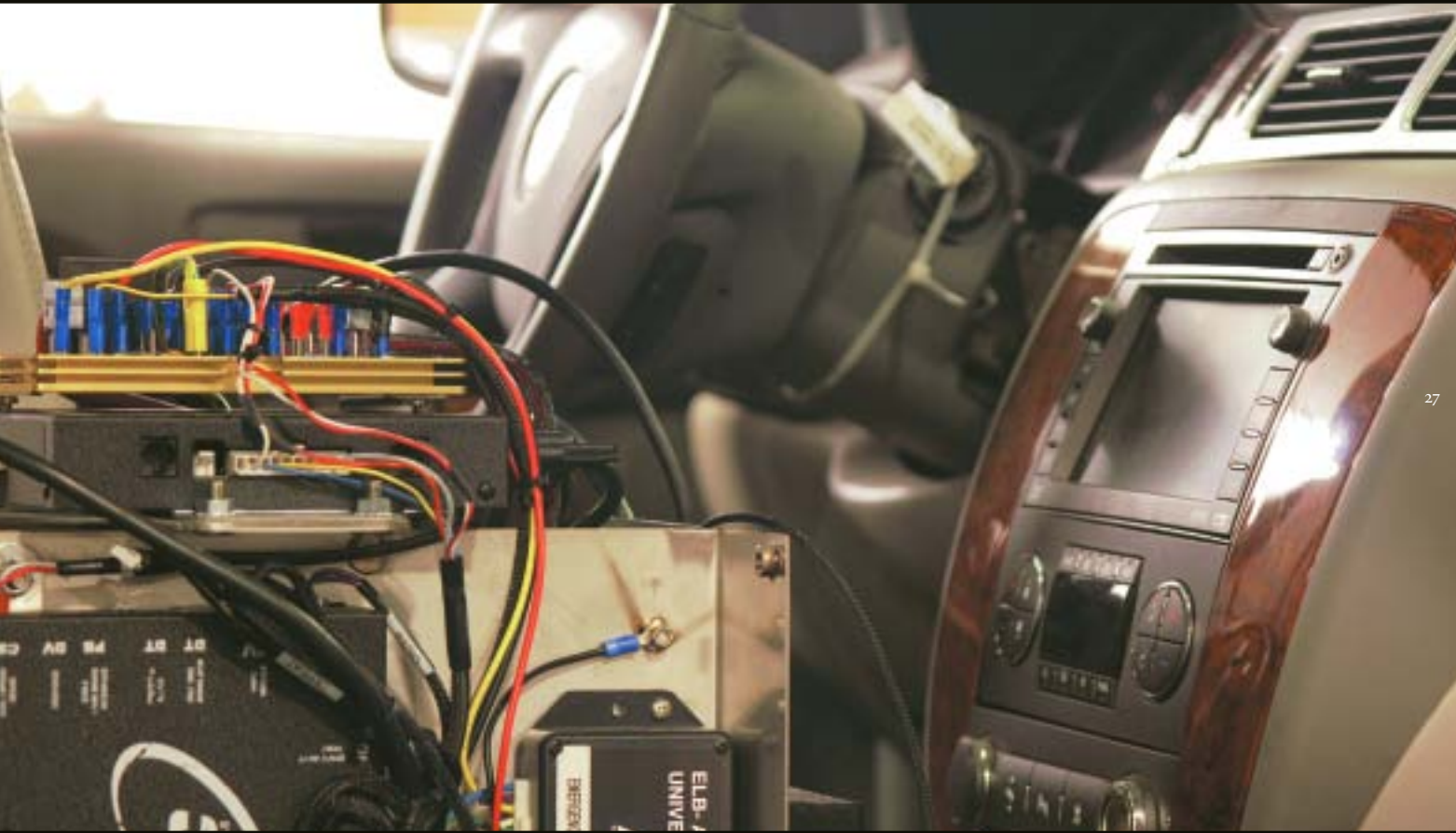


Photo: Vincent Zeng

Above: When the cover of the central console in the Boss robot is removed, the intricacies of its wiring and components are exposed. The console is between the front seats and includes controls and readouts that human drivers can use to monitor and “communicate” with Boss during testing.

Below left: Members of Carnegie Mellon University’s Tartan Racing team work on one of the Boss robots inside the roundhouse garage in Pittsburgh.

Below: Tartan Racing members talk with Allison Heinrichs, a reporter for the Pittsburgh Tribune-Review, while standing next to a Boss SUV on display during a site visit by the Pentagon’s Defense Advanced Research Project Agency.

Photo: Vincent Zeng



Two years ago, the Endowments gave Carnegie Mellon \$200,000 toward the development of “Robot City,” which occupies a corner of former steel mill property that includes the old train roundhouse. The foundation, three other philanthropies — Benedum, McCune and Richard King Mellon — and the nonprofit Regional Industrial Development Corp. are members of the Almono Partnership, which purchased the 178-acre former steel mill and coke works from LTV Corp. in 2002 for brownfield development. In recent years, the site has been the center of robotic development activity for Carnegie Mellon students and researchers, commercial company sponsors, employees of spinoff companies and regional development organizations.

Last year, the Endowments awarded the university \$650,000 to help support the commercialization of the technology developed through the creation of the Boss robots and others. Foundation staff also hopes to see startup companies and new technical jobs created in the Pittsburgh region, as well as innovative programs developed in city public schools that will help prepare students for employment in the robotics field.

“This world-class research is creating a whole new range of exciting commercial opportunities for robotics and advanced automation,” says Christina Gabriel, the foundation’s director of Innovation Economy. “Our support is designed to provide the best possible environment here in southwestern Pennsylvania to take advantage of this. With smooth connections between researchers and the region’s growing cluster of robotics companies, innovations will move quickly into the new

products that can stimulate job growth and lead to broadly shared prosperity.”

William “Red” Whittaker, founder of the Field Robotics Center that developed the Boss robots, is personally committed to encouraging high school students and other young people to have an interest in robotics, which increases the possibility of future school programs based on the new technology, adds Bomani Howze, the Endowments’ Innovation Economy program officer.

“There are great engineers all over the world who will tell you how they were first inspired by the teamwork they learned as part of Red Whittaker’s robotics challenges,” says Howze. “Now middle-school students like those in Pittsburgh Lincoln’s pre-engineering program can have the opportunity to get connected to this work and the career paths that are being created by these industry collaborations in our region.”

Because of ongoing advances in technology, ideas once considered so far-fetched they appeared doomed to the outer limits of science fiction are now a part of life in this millennium. Space exploration, computers and wireless phones have become so integral to our everyday lives that they now seem commonplace. Engineering and innovation have married to create microwave ovens, cyber pets and robotic vacuum cleaners.

Some of this existing computer and sensor technology — along with some sturdy nuts and bolts — served as the foundation for developing the Boss robots. For example, the Tahoe was chosen as the robot platform because it was roomy enough to rig up a central power strip that allowed several researchers





OPTIONAL EQUIPMENT

The Boss robot's exterior accouterments are as elaborate as the technical wiring inside. Shown above are:

- 1 Long- and short-range radars attached to the SUV's grate
- 2 Pan heads, mounted with radars and laser radars, known as lidars; the pan heads can move to check clearance for left or right turns
- 3 A Velodyne lidar, on the front of the roof; the spinning sensor provides a 360-degree view around the robot
- 4 GPS antennas
- 5 Lidars for sensing curbs and lane markings
- 6 Bumper-mounted lidars

and engineers to sit inside with their laptops and work on the software, explains Bob Bittner, head of robot testing for Tartan Racing. By placing bulky roof racks atop the SUVs, team members could easily move, add or remove some sensors, depending on which combinations were the best in guiding the vehicle.

Thanks to Carnegie Mellon's Robotics Institute—more specifically the institute's Field Robotics Center—Pittsburgh is on the cusp of becoming an epicenter of leading-edge technology for robotics. Whittaker is a multi-award-winning educator/scientist whose research has earned him 16 patents along with

center's work, "Pittsburgh is known as a robotics city."

Carnegie Mellon officials established the Robotics Institute in 1979 with the notion of designing machines to perform tasks that may be time-consuming and exacting, or even hazardous for humans, such as exploration and research in toxic environments. Think automated land rovers to explore the lunar surface, Mars and other planets. Through the work of the Field Robotics Center, the university's students and faculty transform such technology into everyday, mostly outdoor, applications—like a car that drives itself.

The Boss vehicles got their cool, muscular name from Charles F. "Boss" Kettering, co-founder of major automotive supplier Delco and a legendary inventor and innovator whose accomplishments include developing the automotive electric starter and the neonatal incubator. The robots were programmed with more than 100,000 lines of software code. The 27 sensors, the global positioning systems, and more than a dozen lasers, cameras and radars enabled the vehicles to have a 360-degree view of their environment.

Two SUVs were beefed up with the extensive technology so that development and refining of the robotics could continue without interruption, says Bittner. When adjustments were

the admiration and respect of colleagues, corporations and students. He confidently asserts that, because of the

Left: One of the Boss robots sits in a warehouse at General Motors' Desert Proving Grounds in Mesa, Ariz. The robots were originally black and tan, but that changed after they arrived in Mesa, where they received a new black-and-blue paint job and sponsor decals. Shown at near left is one of the Boss robots in full rally regalia.

being made in one, the other was up and running. And on race day at the former George Air Force Base in Victorville, the vehicle that didn't compete was available for spare parts, if needed.

After more than 70 other teams failed to make the qualifying rounds or finals, Boss bested the 10 remaining competitors by autonomously navigating the cityscape course, which contained intersections and two-way traffic created by the other robots and 50 stunt car drivers. The vehicles had to obey traffic laws while safely merging into moving traffic, navigating traffic circles, negotiating busy intersections and avoiding obstacles. Boss completed the course in the fastest time of four hours, 10 minutes and 20 seconds, nearly 20 minutes ahead of the Stanford robot, its closest competitor.

For example, as part of its sponsorship, Caterpillar provided advanced technologies such as drive-by-wire steering, sensing and software. The company's electronics system generated the electrical power and air conditioning for the on-board navigation, control and guidance systems. Additionally, Caterpillar had an embedded engineer working full-time with the Tartan Racing team.

"Team Caterpillar is tremendously proud to be involved as a sponsor of Carnegie Mellon's Tartan Racing team. This victory represents what can happen when business and academia combine forces and work toward a shared goal of advancing technology," says Tana Utley, vice president of Caterpillar's Technology & Solutions Division and chief technology officer.

"NOW MIDDLE-SCHOOL STUDENTS LIKE THOSE IN PITTSBURGH LINCOLN'S PRE-ENGINEERING PROGRAM CAN HAVE THE OPPORTUNITY TO GET CONNECTED TO THIS WORK AND THE CAREER PATHS THAT ARE BEING CREATED BY THESE INDUSTRY COLLABORATIONS IN OUR REGION."

Bomani Howze, Innovation Economy program officer, The Heinz Endowments

Beyond fulfilling a sci-fi fantasy, Tartan Racing's victory meant that the \$2 million prize as the world's most accomplished robotic vehicle could be invested in the Robotics Institute to support research. The win also solidified relations with the team's 18 corporate sponsors, which included Caterpillar, Continental, GM, Google, Hewlett-Packard and Intel. Several of the companies are committed to the extent that some of them have established a presence in Pittsburgh to be able to continue to work closely with the project.

Caterpillar's involvement in the competition also has led company officials to open a Pittsburgh office as part of their commitment to pursuing development of automated off-road equipment for use in areas such as mining and construction.

GM is focused on using automation technology to reinvent the automobile in ways that enhance driving safety and reduce traffic congestion, energy consumption and emissions. The company had two engineers who worked on the Boss project.

"This competition has significantly advanced our

Right: A Boss robot sits at a four-way stop during the Nov. 3 Urban Challenge race in Victorville, Calif. The robot can't "see" the stop sign, but an electronic map of the cityscape course in its computers tells it that the sign is there. Boss has to correctly determine which vehicle has the right-of-way to enter the intersection.

Tartan Racing team members, some wearing white T-shirts and others wearing red ones, applaud in the grandstand during the Nov. 4 Urban Challenge awards ceremony.

William "Red" Whittaker, Tartan Racing team leader and founder of Carnegie Mellon's Field Robotics Center where the Boss robots were developed, proudly displays a bald eagle trophy after his team wins the Urban Challenge competition in Victorville, Calif., in November. Not on display is the \$2 million that also was part of the top prize.



understanding of what is needed to make driverless vehicles a reality," says Larry Burns, GM vice president of Research, Development and Strategic Planning. "Imagine being virtually chauffeured safely in your car while doing your e-mail, eating breakfast and watching the news. The technology in Boss is a stepping stone toward delivering this type of convenience . . . We look forward to integrating the technology we used in this race into our cars and trucks, and to ensuring that future personal transportation is sustainable."

Other "real-time" applications of the technology include using robotics to guide tanks and other combat systems into high-risk battle zones without endangering soldiers as well as to aid in the recovery of miners in conditions that could be harmful to rescuers.

Back at Robot City, a row of robots that look like large riding lawn mowers offers a glimpse of the technology's more routine work potential. With various tools and equipment attached to their frames, the robots help with the site development, including such activities as surveying, leveling the land, preparing the ground, removing old walls and structures, shoveling snow, landscaping and mowing.

Leaders in robotics research believe that having a single location for research activities is critical to rapidly transferring technology into commercial application. Applying field robotics to operations and enterprises such as "urban challenges" inspires students and attracts attention to Pittsburgh as an exciting place to develop and commercialize visionary technology.

Already, small companies are starting to crop up in the region to develop new applications for this latest robotics technology. They include RedTeam Inc., which evolved out of the lessons learned from robots built for the 2006 Grand Challenge, a precursor to last year's Urban Challenge. The company uses automated driving technology to perform environmental surveys.

Whittaker also points to Astrobotic Technology Inc., which opened recently to use robotics technology to pursue space enterprises that include working with him on his next project: trying to capture the \$25 million Lunar X Prize sponsored by Google and the X Prize Foundation. That competition will require building a robotic rover and devising a way to land it on the moon, where it must be able to travel at least 5 kilometers and beam photographs back to Earth. The deadline for completing the task is the end of 2012, with a smaller prize awarded if the first successful rover lands on the moon before the end of 2014.

With more earthbound priorities, the technology used in the Boss vehicles is being shared through a "world tour" of various conferences—"Today Show" television personality Al Roker even hitched a ride in the robot at one event—and through journal papers.

Carnegie Mellon and corporate researchers also are continuing to investigate more applications of the technology, bolstered by new possibilities to move abstract, far-flung notions from concept to reality. *h*



here & there

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MAKING HISTORY

Endowments Chairman Teresa Heinz and award-winning historian David McCullough were part of an illustrious assembly recognized April 4 during the Pittsburgh 250 History Makers Gala. Shown at left with them are Mrs. Heinz's husband, Massachusetts Sen. John Kerry, second from left, and Andrew Masich, president and CEO of the Historical Society of Western Pennsylvania, far right. McCullough, second from right, was the keynote speaker for the evening.

As part of the year-long celebration of Pittsburgh's birthday, the sold-out event at the downtown Westin Convention Center honored the 79 recipients of the History Maker Award, which the historical society has given every year since 1992. The late Sen. John Heinz was in the first group of honorees. Mrs. Heinz and the Heinz family received the award in 2002.

More than half of the past recipients attended the gala, including Endowments board members Chris Heinz, who represented his father, Sen. Heinz; Carol Brown; Frank Cahouet; and Franco Harris.

Suellen Fitzsimmons

NEED: 18,000 AND COUNTING

The Negro Educational Emergency Drive, a long-time Endowments grantee, celebrates its 45th anniversary this year. The milestone is marked by a record of awarding nearly \$18.5 million in grants and scholarships to more than 18,000 students, and by a new opportunity to help high school graduates further their education. Shown below are NEED officials at one of the festivities of the year, a ribbon-cutting ceremony at the opening of the organization's new career / college resource center in Pittsburgh. From left are Seldon V. Whitaker Jr., a NEED board member; James "Jay" Ferguson III, the organization's fundraising chairman and president of Fifth Third Bank; NEED President and CEO Sylvester Pace; and attorney Joseph K. Williams III, another board member.



NEED provides stopgap financial aid to Allegheny County students when local, state and federal college funding sources have been exhausted. It is expanding its impact this year by helping with the rollout of the Pittsburgh Promise scholarship program for graduates of city public schools. Because of its

history of working with post-secondary institutions, NEED has been retained by Pittsburgh Promise coordinators to smooth interactions between representatives for the fledgling program and those from colleges and universities. NEED staff is helping Promise coordinators better understand the workings of post-secondary institutions, including the process by which the schools handle and distribute scholarship funds.

It's uncertain whether the organization will continue this assistance beyond the first year of the Pittsburgh Promise program, but NEED President and CEO Sylvester Pace says that some of its existing services will complement the program in ensuring that students are eligible for Promise scholarships. NEED has college advisors at eight of 10 city high schools to work with district counselors in helping students meet college requirements and complete federal student aid forms. The organization coordinates various workshops to give students additional assistance in applying to post-secondary schools. It also manages more than 100 scholarship programs for other agencies or businesses, and works with Pittsburgh-area companies to provide internships to NEED scholarship recipients.

Chuck Austin Photography

GROWING GREENER

The number of Pittsburgh buildings receiving certification under the United States Green Building Council's Leadership in Energy and Environmental Design program continues to grow with the inclusion of two prominent developments. Most recently, the Borders Books building at the Eastside retail center, pictured below left, in the city's East Liberty neighborhood was awarded the LEED Core and Shell Gold Certification, one of the first projects in the country to receive the designation. The honor recognizes efforts to employ sustainable design in the building's structure and in areas such as the heating, ventilation and air conditioning systems.

Developer Mosites Co., Design Alliance Architects and East Liberty Development, the local community development organization, worked together to ensure that the project was community oriented and pedestrian friendly. Design Alliance also collaborated with evolveEA, the LEED management consultant, to include several green features such as piping rainwater into an underground cistern for irrigation use and using reflective surfaces for the roof, sidewalks, drives and ramps to reduce the heat island effect.

Earlier this year, the Encore on 7th, a 151-unit apartment unit in downtown Pittsburgh's Cultural District, shown below right, was awarded LEED residential certification, the first LEED certification for new high-rise residential construction in the city's core. The Pittsburgh Cultural Trust's District Design Committee worked with developer Lincoln Property Co., contractor Mascaro Construction Co. and Oxford Development Co. to ensure that the building met the Green Building Council's LEED residential standards of using less energy, water and natural resources, and creating less waste.

The Endowments invested in both projects as part of its policy of promoting green building in the Pittsburgh region. The foundation's board and staff believe that the Green Building Council's LEED certification is the best current method of objectively determining that a building is green.

Welcoming Bobby Vagt

The Heinz Endowments' new president, Bobby Vagt, keeps a straight face during what was actually a lighthearted moment in his greetings to guests at a Feb. 5 reception in his honor. Looking on, from left, are Chairman Teresa Heinz, who hosted the event, and Vagt's wife, Ruth Anne. Maxwell King, center, who stepped down as president in January, laughs heartily at Vagt's remarks. The reception was held in the Heinz Family Foundation offices, which are housed in the same downtown Pittsburgh building as the Endowments. Attending were nearly 200 Endowments grantees and local community and government leaders.

Vagt joined the Endowments in January after serving as president of Davidson College in North Carolina for 10 years. Mrs. Heinz also used the reception as an opportunity to thank King for nearly a decade of service to the foundation as its president.



Annie O'Neill



Photo courtesy of The Encore on 7th

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