



RIVER CREWS

A HANDS-ON BIOLOGY LESSON ABOARD AN ENVIRONMENTALLY “GREEN” SHIP AS IT SAILS PITTSBURGH’S RIVERS ISN’T JUST A UNIQUE EDUCATIONAL FIELD TRIP. IT’S ALSO A TESTAMENT TO THE VALUE OF PHILANTHROPIC AND CORPORATE SUPPORT WHEN STATE FUNDING FOR SPECIAL PROGRAMMING STARTS DRYING UP. BY BRETT MURPHY | PHOTOGRAPHY BY JIM JUDKIS

From left, Leonard Hall, Christopher Parks and Jevon Broughton, participants in this summer’s Higher Achievement academic program, are observing evidence of birds as a component of the river food chain while on board *Explorer*. During a typical outing, students can watch mallard ducks, Canada geese, rock pigeons, double-crested cormorants, great blue herons or even an occasional bald eagle.





Jim Juddis

The *Explorer* educational experience provides students with opportunities to examine and identify organisms of all shapes and sizes that inhabit Pittsburgh's rivers. Above, RiverQuest Education Manager Suzi Bloom, center, helps Tiffany Hargrave, left, and Tyrelle Bowyer, right, search for macroinvertebrates in a river sample. Right, a petri dish contains material and organisms from the river bottom. Below left, Imari Lockhart-Colon and Tiffany Hargrave talk about what they can observe from a preserved paddlefish in a jar. Below right, Chasity Coleman and other students from the Higher Achievement academic program compare the plankton they see under the microscope with those identified on charts provided by RiverQuest staff.



The Allegheny and the Monongahela rivers

negotiate Pittsburgh's contours, slipping under a quilt of bridges, finally meeting Downtown at a confluence with the Ohio. A morning fog creeps its way under the Fort Duquesne Bridge, low enough to blur the skyscrapers, but high enough to leave the waves in sight. As RiverQuest's signature vessel, *Explorer*, pushes off the dock, the city all but disappears, leaving little to admire besides the water itself.

A group of sixth-grade girls whisper on the deck of the 90-foot vessel. Some enthusiastic boys bounce around the galleys. In the trip's only co-ed group, the boys and girls sit in awkward silence around a table of microscopes. One brave soul, sporting a Steelers jersey and lab goggles, dares to strike up conversation with the girl next to him.

It's a cool morning in June, and the next day will mark the end of classes for kids at Highlands Middle School—at least for a few months. But at this moment, they're caught in the pleasant limbo between square roots and summer. A field trip, then, seems to be the perfect opportunity to help ease the transition.

This is the second time this particular group of 60 students has come aboard *Explorer*. And the two trips were entirely free, free for the students and free for the school.

School districts throughout Pennsylvania have sacrificed special programs and activities because of budget cuts, but Pittsburgh-area foundations and corporations are providing support to help keep the offerings of education nonprofits available. To the gratitude of many teachers and students, RiverQuest is among the organizations that have managed to stay afloat. Funders are trying to preserve RiverQuest because of its long-term impact on science education and environmental responsibility—and because kids love it.

"It's like school, but just better," a young scientist notes while adjusting his microscope.

For 18 years, RiverQuest has provided a "floating laboratory," equipped to offer professional studies of the river ecosystems. Schools applaud the program because of its unique approach to education, encapsulated by its maxim: "Tell me, I'll forget. Show me, I might remember. Involve me, I'll understand."

"We try to redefine the phrase 'field trip' to one that fits our philosophy of involvement," RiverQuest Executive Director Gerry Balbier says. "We call it a 'voyage' because people are discovering this asset called 'the rivers.'"

Throughout the day, students analyze the water, as both chemists and biologists. They test for temperature, pH levels (acidity), oxygen content, turbidity (cloudiness) and—the kids' favorite—plankton life. There's even a session on the geology and ecology of the Marcellus Shale, a natural gas deposit that underlies much of Pennsylvania.

And RiverQuest's emphasis on science education provides a platform where The Heinz Endowments' educational and environmental initiatives intersect.

"Ultimately, we're not going to maintain the commitment of citizens to the importance of environmental protection if we don't engage them early on," says Caren Glotfelty, formerly the Endowments' senior Environment Program director.

"RiverQuest has the ability to place kids in a different learning setting," adds Education Program Director Stan Thompson. "Kids will leave with not only a greater knowledge of their environment, but also an understanding of how they can become stewards of their own community."

When Balbier was senior program officer for the Endowments' Education Program, his first grant was to Pittsburgh Voyager, later renamed RiverQuest. It was a small, education nonprofit that used retrofitted World War II naval ships to teach environmental science to students in the Pittsburgh region. However, the *Discovery* and *Voyager* boats were unsustainable, says Glotfelty. "They were a big drain on the organization's budget because it was so expensive to maintain the boats," she says of the program's early difficulties. And the problem was amplified because the ships couldn't hold enough students—43 people maximum—to generate revenue.

But in 2008, *Explorer* finally arrived in Pittsburgh. The first "green" education boat in the world, *Explorer* can hold 120 people and is powered by a hybrid-electric propulsion system and retrofitted with environmentally friendly technologies—from the low-flow toilets to the hull made entirely of recycled steel.

Explorer also brought with it a reaffirmed commitment to RiverQuest's mission. Glotfelty and Balbier agree that lessons in science education and environmental responsibility are more convincing when taught aboard a green vessel.

"We're walking the talk when it comes to environmental practice," Balbier notes. "We have a lot more credibility than we did before, and we can say that our operations are green as well as our curriculum."

And he thinks funders value RiverQuest for that. The Endowments' Environment Program has given more than \$3.8 million in grants since talk of the new boat began in 2004.

Funding, Balbier acknowledges, is a daunting priority of not only RiverQuest, but all nonprofits. Since the economic downturn started in 2008—incidentally, the same year *Explorer* reached Pittsburgh—education programs throughout Pennsylvania have been drastically cut back.

The budgets for state-funded schools continue to shrink, with districts still trying to recover from the \$860 million in state funding cut from K–12 education in the 2011–12 school year. Each district has been handling the pinch differently. Measures have included pay freezes and rollbacks, furloughs, early retirement incentives and major cuts to "non-essential" programs. The challenge for organizations like RiverQuest has been to remain essential in the eyes of local districts.

"School districts are being forced to cut into core educational programs, creating greater obstacles for success both now and long into the future for many of Pennsylvania's 1.7 million students," contends Pennsylvania Association of School Administrators Executive Director Jim Buckheit in a statement released last year. The organization has decried the impact of losses in state and local revenue on student learning.

Ron Baillie, co-director at the Carnegie Science Center, a longtime collaborator with RiverQuest, says school districts are being assessed on their ability to teach a specific curriculum, one focused very much on science, technology, engineering and mathematics (STEM) education. As money tightens, districts are being forced to come up with creative ways to effectively teach the same material that students see on the standardized tests. And the RiverQuest experience fits directly into the curriculum, adds Baillie.

According to the U.S. Bureau of Statistics, STEM jobs are projected to grow twice as quickly as jobs in other fields in the

SCIENCE



(CLASS)ROOMS WITH A VIEW

Constructed of recycled steel, *Explorer* is crafted like a green building. It features systems to conserve energy and potable water. Students can work in groups of 10 in the nine designated lab stations and a covered outdoor deck. In addition to student programs, *Explorer* offers short cruises for all ages, such as "adventure voyages" that tour local bridges or provide hands-on instruction about the life of a riverboat crew.



RIVER LIFE

The learning experience on *Explorer* combines water and field observations or tests with additional information on recent weather trends, nearby land use, and regional industrial and environmental history to reach conclusions about the rivers. Mayfly nymphs, for example, are an indicator of reasonably good water quality.



ON THE RIVERS:



FIELD STUDY

Educational voyages on *Explorer* include examination of the entire river food chain, from microscopic plankton on one end to birds and mammals on the other. Students identify birds on or near the rivers based on appearance and behavior.



A CLOSE LOOK

Students aboard *Explorer* examine macroscopic organisms, which can be seen without magnification, as well as microscopic ones. The young scientists still use a stereoscopic "dissecting" microscope, however, to view some larger, macroinvertebrate organisms such as this net-spinning species of *caddisfly larva*, which is considered to be moderately tolerant of pollution.

High school students from Pittsburgh's North Side assist RiverQuest Education Manager Suzi Bloom in lowering a spring-loaded device that retrieves samples from the surface of the river bottom. The samples will contain macroinvertebrates such as worms, mayfly larvae and other aquatic insect forms that live in mud and debris. The organisms will later be identified and categorized to determine what they reveal about the river's water quality.



Joshua Franzos

next five years. And the United States will have more than 1 million job openings in STEM-related fields by 2018, yet only 16 percent of bachelor's degrees will specialize in them.

Since former President George W. Bush's "No Child Left Behind" and President Barack Obama's "Race to the Top" campaigns, STEM education has moved into the national spotlight, but schools still struggle to create enthusiasm at the K–12 levels. Early STEM education, taught in hands-on environments, is critical in nurturing the curiosity young people already have, says Baillie.

It's a curiosity that, he fears, is too often dampened in middle school classrooms. Although U.S. fourth-graders score well against international competition, they fall near the bottom or dead last by 12th grade in mathematics and science, according to the U.S. Department of Education. "It's much easier to keep young kids interested in science than it is to let them get away from it and [then] try to re-energize them when they're 13," Baillie says.

Kristen Burns, associate director of The Grable Foundation, says that, in getting children out of their typical classroom environment, RiverQuest has the rare opportunity to physically engage students in the natural world, cultivating passion at early ages. "At its best, [RiverQuest] can inspire a lifelong interest, which is especially important now because of the demand for STEM-related skills."

Still, some schools can't afford to allocate any funds to field trips, even those as enriching as RiverQuest. If they qualify, as Highlands Middle does, these schools can receive a full subsidy.

"If the RiverQuest trips weren't entirely subsidized—from the buses to the substitute teachers—we'd have to either charge the students a fee, try fundraising or cancel the trips altogether," Highlands Middle School teacher Karen Davidek says as her class reins in water samples from the boat's stern.

Many of her students come from lower-income families and wouldn't be able to afford a fee. The program is indispensable, especially for these students, because careers in science often seem so intangible, so unrealistic. In that respect, RiverQuest aligns with the goals of the Endowments' Education Program,

which has granted more than \$2 million to RiverQuest since 1993. Those goals include supporting educational efforts that help build a more equitable and inclusive society as well as meet high-quality learning standards.

"This is the way to show [students] a practical pathway to future majors and future careers," says the Endowments' Thompson. "There's also a cultural sensitivity that the program can provide."

As they cruise down the Ohio, the Highlands Middle School students are joined by swarms of mayflies. Under other circumstances, the insects could be viewed as a nuisance, but for the students, they're evidence of life. Mayflies live for only one day as adults—a fleeting but certainly not boring life dedicated to reproduction—and they wouldn't be able to survive for three years underwater as larvae if the rivers were polluted.

"Even though we can't talk to the mayflies and they can't talk to us, they can still tell us a message about the health of our rivers," RiverQuest educator Linda Willhide says. "When we find those mayflies, it's as good as them being able to whisper in our ear, 'These rivers are clean.'"

The backbone of RiverQuest is the scientific process in which students are challenged to confirm or deny a hypothesis, says Balbier. They gather their own evidence, make their own observations, and come up with their own conclusions. The question every field trip tries to answer: Are the rivers healthy?

Since the 1972 Water Pollution Control Act Amendments ushered in stringent controls on industrial policy and increased public awareness, Pittsburgh's rivers have been on the mend. But even though stretches of greenery and trail ways have graced much of the riverfront, erasing the entrenched stigma is still no easy task.

Sporadic reminders of the region's post-industrial legacy linger along the riverfront: a few docked barges, trains hauling what appears to be manufacturing cargo and small pockets of vacant lots. Balbier says it's not until the city is put under a microscope that the rivers can be truly understood.

Connection—to the rivers and to the region—is a lesson he hopes each student learns from RiverQuest. More important for the organization, though, Balbier strives to impress upon funding communities the merit of teaching these connections.

Having worked from the funders' side of the table, Balbier understands what nonprofits need to do to survive. His experiences at the Endowments helped him “develop approaches to raise money and give boards reasons to want to fund us.” For example, he's found that enlisting schools to go and make arguments on RiverQuest's behalf gives funders a concrete feel for the program's success. “It makes us a program of value, something to be prioritized.”

Still, as school districts struggle to pay for the trip, RiverQuest needs other support more than ever. Balbier tries to tap into the for-profit sector's common goals of community betterment and image—and corporations are stepping up.

“Without the foundation community, we wouldn't be around. But more and more we're looking at corporations that have access to tax programs that enable them to support places like us,” Balbier says. Corporations are using the Pennsylvania Educational Improvement Tax Credit program funds to meet the community goal of increasing the quality of life in the region. Under the program, RiverQuest is eligible to receive contributions from businesses, which, in turn, can receive a tax credit of up to 90 percent of their donation. “They want to balance their image, and I think they're doing that quite successfully,” Balbier says.

Wendy Lomicka, sustainability and community engagement leader for plastics producer NOVA Chemicals, explains that RiverQuest's work reflects her firm's commitment to environmental stewardship.

“We at NOVA Chemicals are pleased to be able to support RiverQuest in carrying out its mission to engage students and people of all ages in learning experiences and other efforts that raise awareness about the importance of our rivers,” she says. “The rivers literally define the geography of this region and are essential to its ongoing health and prosperity. By supporting STEM education through organizations like RiverQuest, NOVA Chemicals hopes to join others in making a positive and lasting difference to the region's future workforce, its health and its environment.”

Even with all this support, public visibility remains the major steppingstone toward permanence, says Balbier. He is working on different, low-cost marketing strategies—from

social media to public fundraising campaigns—to put RiverQuest in “every riverfront development conversation.”

“The Allegheny, the Monongahela and the Ohio are our stages for presence, and it's up to us to make ourselves known all over the Pittsburgh region,” Balbier says.

Back on the *Explorer*, there's a silence below the main deck. The Highlands Middle School students have just affixed their microscopes with slides of water samples, and, not unlike a team of scientists on the brink of discovery, they peer into the eyepieces, adjusting the focus to make sense of the budding ecosystem under their lenses.

“Daphnia puli-caria.”

“Steph-a-no-discus.”

The young oceanographers sound out different types of phytoplankton listed on the chart they use to compare to what they see swimming on the slides. In the days leading up to the trip, they were taught about river ecosystems and water life using the “Captain's Chest” materials that RiverQuest provides to schools; but, standing hunched over their microscopes, they light up as if they've never before heard of “nephrocytium” or “crucigenia.”

They react this way because they're actually seeing the squiggly, shrimp-looking organisms maneuvering around the slide instead of looking at pictures in a textbook. Or as one young scientist, wearing glasses under lab goggles, shouts from an isolated corner of the lab, “Dude, I have a fat, circley thing eating a whole bunch of twitchy molecules!”

“When you talk about learning with any age group, it's the doing, the experiential dynamic, that's always going to reinforce what you hear from a teacher or read in a book,” says the Endowments' Thompson. “You can touch, see, feel, smell these things, and there's just so much more that it evokes in terms of your ability to connect and learn.”

On the way back toward the dock, the early afternoon seems to have lifted the fog, and clear skies give way to a crisp view of the skyline. The sixth-graders lean over the rails, trying to take in as much as they can before the long walk back to the buses. One student pretzels himself around a chair and tries to barter with Davidek, his teacher, for another hour on the boat. No such luck.

“Kids—separate from the science of [the voyage]—start valuing Pittsburgh differently,” Balbier says. “And they always want to come back.” *h*