



Removing an invasive lion fish from the Belizean reef.



Interviewing marine biologists via web conference.



Maintaining organisms in the touch tank.



Practicing a survey method for population tracking.



Student facilitates a boy scout field trip.

The Ripple Effect of a Marine Biology Fellowship

Lisa Clark taught marine biology at Tuscaloosa County High School with two strikes against her: no working knowledge of the subject and students who lived 200 miles away from Alabama's nearest sea shore. Along with its lab activities and lesson plans, Lisa inherited the class from a peer who taught it for the previous 30 years. But confidence and knowledge is not passed down. She designed her fellowship to join a Belizean reef research team and return to Northport, AL, with on-the-job training.

"Even though marine biology *sounds* really interesting and exciting, I was intimidated – and a little scared – to be responsible for students' learning when I knew nothing," explained Lisa. "At first, I mined text books and studied preserved specimens for information on marine life. But this second-hand knowledge didn't give me ownership of the topic."

Lisa spent two weeks last July on Tom Owens Caye, conducting reef research for an ongoing conservation

project headed by the Belizean government. She also learned to identify and survey organisms and established working relationships with renowned marine biologists.

"Getting to do something that I believed would make me better was so motivating and refreshing."

"We know these underwater ecosystems are there, but being able to actively observe and study the anatomy and behavior of its organisms left me wanting to learn more and excited about my new subject matter," said Lisa.

With a portion of her grant, she purchased organisms indigenous to Belize for a 100-gallon salt water tank in which students replicate survey skills Lisa learned. She also purchased web cams to facilitate student conferences with the experts she worked alongside. Building on communication skills and

knowledge gained from these Q&A sessions, students now host their own web conferences and field trips, teaching elementary students across the district about marine life.

Lisa joined Fund for Teachers' first class of Alabama Fellows last year. Her initial reaction to the grant opportunity was skepticism. "I had never heard of a program that asks teachers, 'What do you want to do? What do you think would benefit your teaching?'" said Lisa. "Getting to do something that I believed would make me better was so motivating and refreshing."

This issue of *Odyssey* highlights the work of teachers...



who pursued science, technology, engineering and math (STEM) learning with Fund for Teachers grants.



2000 Post Oak Boulevard, Suite 100
Houston, Texas 77056-4400
713-296-6127 or 800-681-2667
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Our Mission

Fund for Teachers enriches the personal and professional growth of teachers by recognizing and supporting them as they identify and pursue opportunities around the globe that will have the greatest impact on their practice, the academic lives of their students and their school communities.



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From the Executive Director



Karen with faithful FFT friend Dr. Kelli Cohen Fein.

Spring is my favorite time of the year, so full of potential, renewal and growth. A good teacher personifies the season, ever nurturing students as they advance toward their fullest potential. It is fitting that Fund for Teachers' annual selection process is conducted in sites around the country throughout March. It's been my springtime pleasure and privilege to visit and work with the over 350 volunteers comprising the selection committees this year. Witnessing their commitment to awarding exemplary teachers' proposals is absolutely invigorating. Our applicants' proposals represent these professionals dedicated intent to reinvest and improve on their skills. The potential the resulting grants

represent for the teachers and their students thrills me. Watch our Facebook and Twitter feeds for the announcement of our 2013 Fellows and updates from their fellowships throughout the summer.

Continuing with the theme of renewal, Fund for Teachers welcomes a new board chair this spring in Walt Smith. A founding board member, Walt is an ardent supporter of and loyal friend to our mission; now, he will help guide our growth as we annually add partnering organizations and program locations – most recently, the Ellbogen Foundation in Wyoming, the national nonprofit Math for America, and teachers across the great state of Texas.

Joining the world's recent celebration of Pi Day (March 14 – 3.14), we dedicate this issue to the work of a few Fellows pursuing STEM-related topics with their Fund for Teachers grants. Nurturing students' growth in these fields will help raise American students' ranking in the global Trends in Math and Science Study and prepare them to compete in the global marketplace.

When I'm not working to cultivate new donors and Fellows, I can be found in my garden. Planting seeds and helping them grow, I now see, is a theme in my life and work. Please join me in this most rewarding effort by supporting Fund for Teachers. "Harvest what you plant."

See you in the garden,

Karen K. Webb
Executive Director

After serving as a board member since Fund for Teachers' inception, Walt Smith now assumes its chairmanship.

Smith recently retired as managing partner of Baker Botts, an international law firm known for its leadership in the energy, technology and life science sectors. Under Walt's leadership, Baker Botts has for many years been supportive of Fund for Teachers.

"Watching Fund for Teachers' growth and contribution to our nation's teachers over the past decade has been one of the highlights of my charitable endeavors, and I now look forward to devoting more concentrated time and effort to the organization as board chairman," said Smith. "More than ever, teachers need the recognition and support these grants provide, and our dedicated staff and board are committed to advancing Fund for Teachers' impact."

Smith replaces John Gulla, who rotated out of the chairmanship in February but remains on the board.



Walt and his wife, Mary Lou, were honorees at Fund for Teachers' Food for Thought event last October.



“I want to show my students that science-related careers aren’t just in laboratories and can be very lucrative.”

Hiking to the site of Ötzi’s discovery.

Time of Death: 3,300 BCE

Crime Scene Forensics is a new class at Brooklyn’s School for Democracy and Leadership, but a common practice in the streets surrounding it. When not personally affected by the aftermath of crime, students watch dramatized versions on television. Kelly Houston capitalized on students’ familiarity with forensics to create an upper-level course focusing on biology and science-related careers. Her cadaver of choice is the world’s oldest observable murder victim: Ötzi the Iceman.

On her fellowship last July, Kelly hiked 14 hours along the Italian-Austrian border to the excavation site of Ötzi, a 5,000-year-old mummy. She later explored related artifacts during a private tour of the South Tyrol Museum of Archaeology’s Ötzi exhibit in Bolzano, Italy. These experiences inform a new mastery project for Kelly’s forensics students who develop hypotheses about Ötzi’s murder, research artifacts Kelly obtained, refine theories and present findings to the class.

“When students hear about my fellowship and see pictures of me trekking across glaciers through snow up



Ötzi, the oldest natural mummy from the Copper Age.

to my hips, 10,000 feet above sea level, they think I’m crazy,” said Kelly. “But then they get excited and want to know what Ötzi was doing so far up there. The investigation begins.”

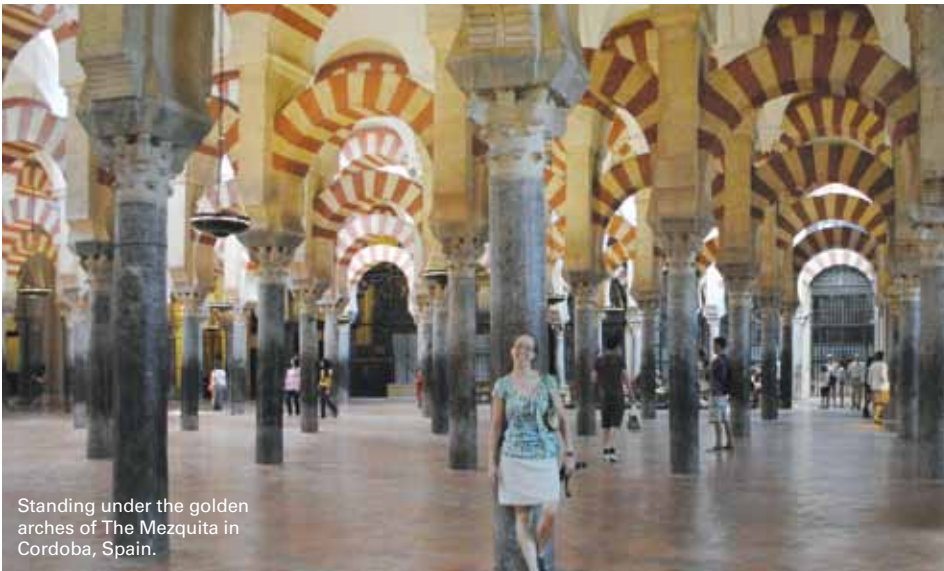
Using Ötzi as a case study helps Kelly engage students who enter her class with many distractions. Most of her students come from single-parent families and work after school to support them. Gang violence is also a prevalent

issue, claiming the school’s fourth student by mid-February. According to Kelly, she has to make class interesting to capture students’ attention.

In addition to practicing scientific inquiry, investigating Ötzi’s death helps students see a different side of science – one not limited to “goggles and Bunsen burners.” “Because so few minorities are represented in the sciences, I want to show my students that science-related careers aren’t just in laboratories and can be very lucrative,” said Kelly.

Throughout the mastery project, Kelly finds students observing her as much as they do Ötzi. “They see in me a teacher continuing my education and learning, not because I have to, but because I’m generally interested in learning about the world,” she said. “They realize learning can be fun and doesn’t always have to be from a textbook.”

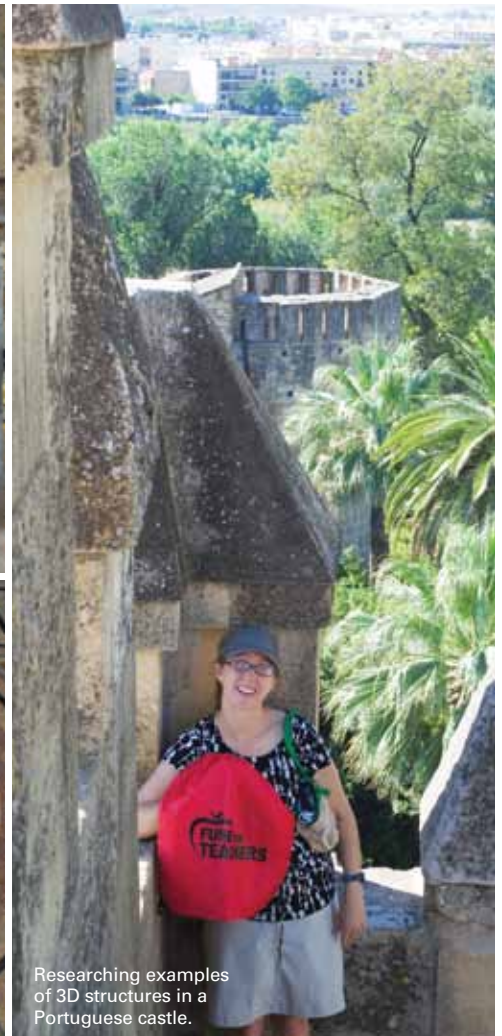
Editor’s note: Scientific tests carried out by forensic scientists show that Ötzi was fatally injured by an arrow and bled to death soon after. Further evidence reveals that he was 5’5” and 45 years old when he died, his last meal was red deer and herb bread, and he was lactose intolerant.



Standing under the golden arches of The Mezquita in Cordoba, Spain.



Camouflaged in the center of geometric patterns at Lisbon's National Parthenon.



Researching examples of 3D structures in a Portuguese castle.

Geometry Bridges Cultural Divides and State Standards

Geometry is obtuse to teenagers, particularly those emigrating from 12 countries and primarily speaking Spanish, Portuguese and Arabic. Robin Mankel, teacher at Boston's Brighton High School, was accustomed to student apathy toward math; overcoming cultural divisions required a new teaching angle. She designed a fellowship to research examples of geometry in her students' countries of origin and create a unifying classroom environment.

For three weeks last July, Robin crossed the Iberian Peninsula exploring castles, cathedrals and World Heritage Sites influenced by the Moors. She daily updated her blog (rmankel.wordpress.com) where students followed the journey. "The Monastery of Jernimos contains a beautiful church and cloisters that are an architectural highlight in Lisbon," she wrote on Day 10 of her fellowship. "When I walked into the

cloisters, I was so excited to see the rectangular prisms, cylinders, and cones repeating along the center green space of circles, rectangles and trapezoids. I couldn't have asked for more direct connections to our 2-D and 3-D units!"

Robin uses her blog, photographs and data when teaching students to "look for and make use of structure" and create "modeling with mathematics," two benchmarks from the Massachusetts Curriculum Framework for Mathematics. Colleagues in the English department are adapting Robin's experiences to help students "develop writing skills and tools for new language learning" and fulfill an English as a Second Language Common Core Standard. Students will write papers about the people and places associated with Robin's odyssey.

These enhanced courses honor the school's core values of mutual respect and inclusiveness by celebrating the

history and art from Middle Eastern, Cape Verdean, South and Latin American countries representing 93% of her students' countries of origin. Robin's work also supports Boston Public Schools Superintendent Carol Johnson's vision of "acknowledging and respecting people with diverse backgrounds, histories and perspectives."

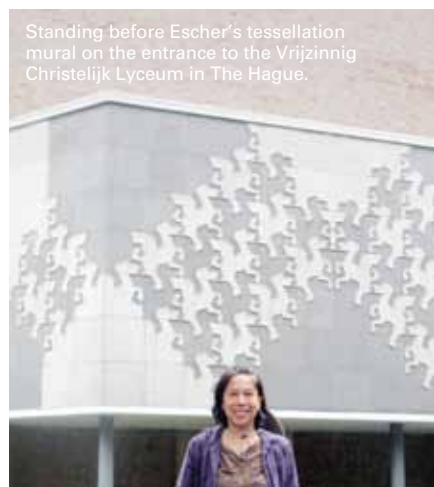
"During my fellowship I searched for geometric patterns and figures to breathe life into the curriculum and I returned with more than I ever imagined," said Robin. "The materials are changing the way that I approach the content and, in turn, inspiring my students to appreciate their cultural commonalities and look for math in the world around them."

Finding Beauty in Mathematical Symmetry, Proportions and Patterns

English art critic Sir Henry Read believed that “art is pattern informed by sensibility.” For Jennifer Wu, teacher at Capital City Charter School in Washington, DC, that sensibility is math.

“Math and art are taught in modern schools as separate subjects; during classical times they were considered complementary,” explained Jennifer. “Numeracy is often overlooked or used to support other learning disciplines, but I strongly believe that math should have its own identity. I sought in my fellowship opportunities to make connections between numbers and patterns in art.”

Last July, Jennifer explored artwork by Piet Mondrian and M. C. Escher in Dutch museums and public spaces to raise key questions about the roles that symmetry and proportions play in art and math. With her learning and related artifacts, she’s now teaching middle school students a new curriculum on the beauty of art through a mathematical lens. Her goal is to make math more accessible and enjoyable by looking at its everyday applications students haven’t explored.



Standing before Escher's tessellation mural on the entrance to the Vrijzinnig Christelijk Lyceum in The Hague.



Visiting Mondrian's birthplace in Amersfoort.



Students design Mondrian artwork for math work.

For one project, students designed Mondrian-inspired artwork and then modeled the area of the multiple rectangles using expanded and factored forms of the distributive property. Students read background information on both artists’ biography and aesthetic style, and mastered vocabulary related to fine arts, geometry and algebra. This spring, students explore Escher’s tessellation artwork in a unit on geometric transformations and symmetry.

“With the advent of the Common Core standards, we are compelled to delve deeper into our mathematic rigor through authentic learning experiences and projects,” said Jennifer. “My fellowship is helping students develop mathematical skills required in these standards by inspiring an appreciation of math in a connected way.”

Additional teachers using 2012 FFT grants to pursue STEM-related fellowships include:

Erin Anderson, Mary Droster and Drew Kreuser (Black Hawk Middle School – **Madison, WI**), who explored ecosystems, biomes, animal and plant life in the Galapagos Islands to create new units for science, social studies, and language arts classes;

Diane Dibrell (15th Street Elementary School – **Los Angeles, CA**), who examined weathering, geologic formations and natural resources across Utah and Nevada to instill in largely immigrant students an understanding of science and social studies as outlined by state standards while building appreciation of the United States as a country worth exploring;

Karen Lechner (Evergreen Community Charter School) – **Asheville, NC**), who participated in a home/design workshop at Yestermorrow Design Build in Warren, VT, to develop hands-on math lessons that contribute to students’ drawing, design and model construction of a habitable Appalachian building;

Andrew Lindsey (Hastings High School – **Houston, TX**), who toured homes and labs of famous European scientists to introduce students to the people behind the discoveries and convince them that careers in science are attainable despite difficult personal circumstances;

Ann Boor Carbonetto (Andrew Jackson Elementary Language Academy – **Chicago, IL**), who engaged in the Hands-on Middle School Science Summer Institute at San Francisco’s Exploratorium Museum to transform students’ math/science related questions from “so what?” and “who cares?” to “how?!” and “why?!“;

Kevin Denton (Polaris Expeditionary Learning School – **Fort Collins, CO**) who observed micro lending, well water and poverty initiatives in Rwanda to create a math/economics unit that demonstrates the meaningful role math can play in solving real world problems; and,

Melissa Bopp (Brown Middle School – **Chattanooga, TN**) who compared and contrasted the habitats, adaptations and behavior patterns of birds in Yosemite and Sequoia National Parks to create a birding unit that stimulates student interest in outdoor conservation and adventure.



Researching storm surge solutions in Venice.



Learning about the canal system from a Royal Netherlands Embassy ambassador.



Fifth graders research project on "Rising Seas"



Researching windmills in Zaanse Schans, Netherlands.

Surging Interest in Geo-Engineering

Hurricane Sandy provided an unfortunate case study for Jacki Bruce-Yamin's unit on geo-engineering. For the past year, her fifth grade students at Washington DC's Thomson Elementary explored strategies for protecting land from storm surges and reclaiming it for agriculture and expanding populations. Without a curriculum to teach the topic, Jacki created her own based on experiential learning in Amsterdam and Venice last summer.

"Last spring, one of my students wanted to learn about geo-engineering and I began to see the creativity that form of science entails. This led me to consider climate change and how the world was facing the challenge. I decided my students needed to be introduced to geo-engineering in order to make informed decisions about how to prepare for rising seas. But my lack of knowledge and text books on the subject was a major hurdle," explained Jacki.

Together, the class conducted research for Jacki's Fund for Teachers grant proposal on the topic and

anticipated an acceptance letter. In the meantime, they analyzed how windmills worked and marveled at technology developed to protect The Netherlands and Venice from extreme storms. Teacher and students discovered how geo-engineers collaborate globally and share ideas to solve problems associated with climate change.

"Science is like a mystery that develops deductive reasoning and encourages the development of higher level thinking skills."

In June, Jacki's fellowship extended the class' scientific inquiry. In Europe, she interviewed the director of Waternet (Amsterdam's regional water authority), toured windmills and more modern steam-powered pumping stations and walked on levees blocking brackish inlets to form fresh water lakes. Venice's city planning agency and archives provided technical information about modern materials used to combat the destructive effect of water on buildings' foundations.

Conversations with Venetians yielded strong opinions on a costly new project designed to protect the lagoon from storm surge. Each night, Jacki recapped her progress in emails to students and their families.

This spring, a new class of fifth graders study Jacki's "Rising Seas" unit in preparation for capstone research papers and presentations. Representatives from the Royal Netherlands Embassy spoke to the class about Amsterdam's water management protocols, and parents participated in an "at home" project by taking students to a city location altered by geo-engineering.

"Science is like a mystery that develops deductive reasoning and encourages the development of higher level thinking skills," said Jacki. "My fellowship continually challenges students to think beyond a simple six-week unit to explore the topic of water management regionally and globally, from the past, in the present, and into the future."



Conducting soil sampling at National Park Corcovoda.



Testing water from Carpenter's Bayou.



Bird watching in the rainforest.



Teaching children about conservation at Jesse Jones Nature Park.

A Minority Stake in Science

Growing up in India, Bhavna Rawal conducted experiments in her backyard because minorities, a.k.a. females, weren't permitted to pursue science in schools. With a high school teacher's encouragement, Bhavna studied engineering at university – one of two women in her graduating class. After earning Master's degrees in chemistry and education in Houston, Bhavna assumed her mentor's role as a high school teacher encouraging minorities to pursue science.

"It's important to give my minority students at Quest Early College High School role models and motivation in the sciences. For example, girls believe it's not the field for them," said Bhavna. "I felt the need to provide real-life examples of science because I believe when students see knowledge applied, they connect with the subject and take initiative for their learning."

Bhavna designed her fellowship to research biodiversity in Costa Rican rain forests, cloud forests, volcanoes and beaches, focusing on national

conservation efforts. With new experiences and insights, she established a school-wide Green Club last fall. For one project, members compared and contrasted Costa Rica's biodiversity with Houston's during walks down a nearby bayou. Students observed trash severely impairing the ecosystem and created signs they then posted along the waterway discouraging pollution – signs similar to those they saw in Bhavna's photos from Manuel Antonio National Park. In March, students manned a booth at a nature center, leading children in water and soil analysis to teach the importance of environmental protection. In recognition of their environmental activism, Bhavna's students received the Green Award from the National Energy Education Development (NEED) organization.

Bhavna also shares her fellowship learning with educators, encouraging them to use Fund for Teachers fellowships to incorporate project-based learning into science curricula. This year, she addressed the Conference

for Advancement of Science Teaching, Texas Teachers Association, North American Environmental Educational Association and, in April, speaks to the National Science Teachers Association.

"Introducing students to environmental sciences through my fellowship sparked their interest in pursuing careers in environmental engineering, geology, GIS mapping and marine science – jobs not readily seen in our community," said Bhavna. "Exposing students to the application of science in the real world and encouraging further investigation impacts their learning, college study and career selections."

It worked for Bhavna's teacher.



Fund for Teachers
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Throughout March, 365 civic, corporate and educational leaders met in program locations across the country to select Fund for Teachers' 2013 Fellows. Teachers representing almost 1,000 schools applied for grants this year. Our newest Fellows and their project descriptions will be revealed on our Facebook and Twitter feed in early April.

Kathleen Kennedy, 2012 Fellow, Alicia Washington, attorney with Simpson Thatcher & Barlett, and John Tulenko, education reporter for PBS, help select New York City's 2013 Fellows.