

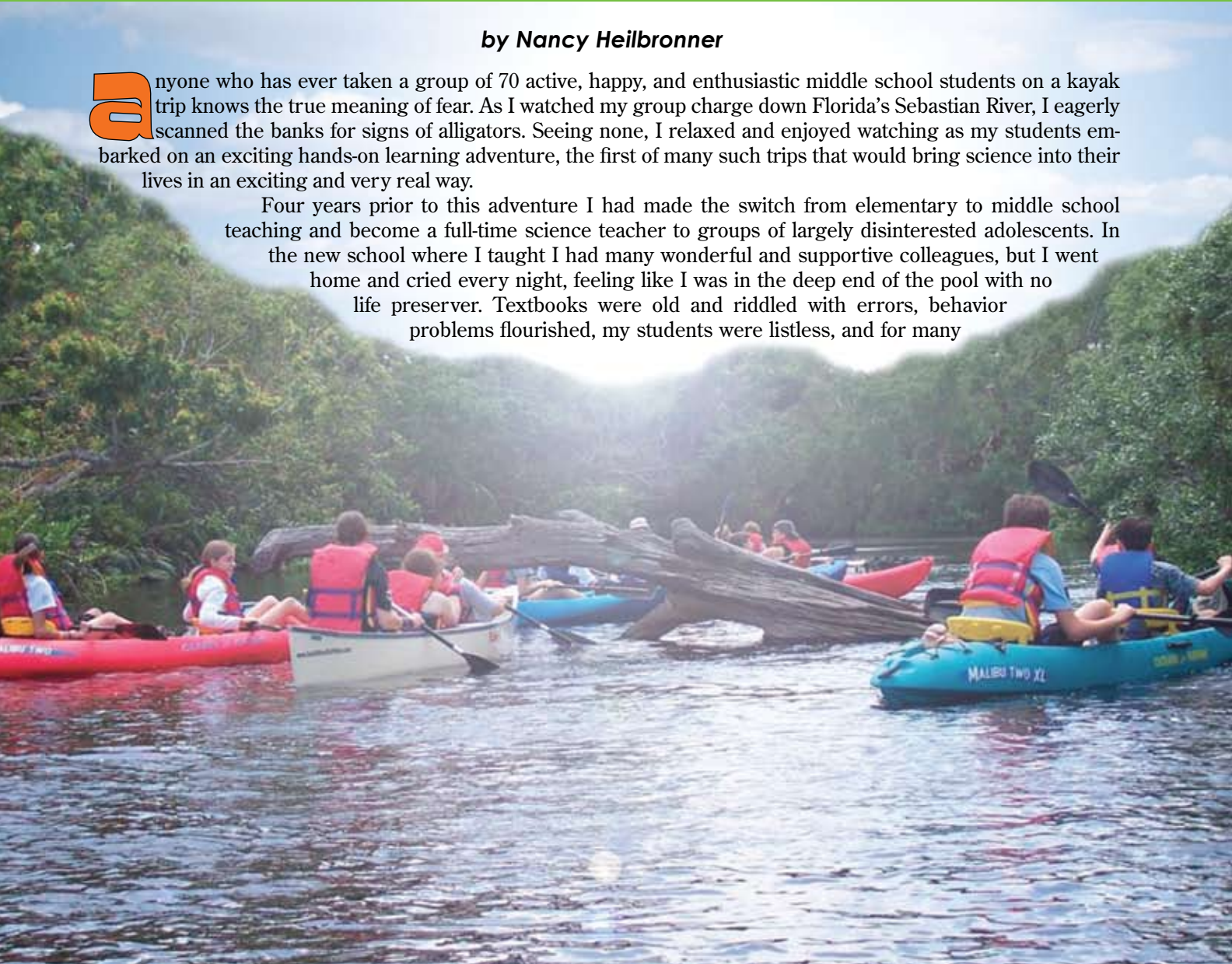
SCIENCE SAFARIS

Developing Bold Academic Explorers Outside the Science Classroom

by Nancy Heilbronner

anyone who has ever taken a group of 70 active, happy, and enthusiastic middle school students on a kayak trip knows the true meaning of fear. As I watched my group charge down Florida's Sebastian River, I eagerly scanned the banks for signs of alligators. Seeing none, I relaxed and enjoyed watching as my students embarked on an exciting hands-on learning adventure, the first of many such trips that would bring science into their lives in an exciting and very real way.

Four years prior to this adventure I had made the switch from elementary to middle school teaching and become a full-time science teacher to groups of largely disinterested adolescents. In the new school where I taught I had many wonderful and supportive colleagues, but I went home and cried every night, feeling like I was in the deep end of the pool with no life preserver. Textbooks were old and riddled with errors, behavior problems flourished, my students were listless, and for many



of them science was both meaningless and boring. I knew that to reach these children, I would need to make science come alive.

When I considered science pedagogy, I instinctively knew that science, like most subjects, can only come alive when students are actively engaged in real-life pursuits that interest and challenge them (VanTassel-Baska and Bass 1998). Educators in the field of talented students have long known that a “rising tide lifts all ships,” an idea that Renzulli (1998) believes can be applied to all students. That is, if educators provide activities that are interesting and challenging for all students, they will rise to the occasion. A well-documented phenomenon, known as the Pygmalion effect, found that learners rise to higher levels of achievement if an atmosphere of trust is established and more expected of them (Rowe and O’Brien 2002). How was I to implement change that would both interest and challenge my students?

Setting a goal for inquiry-based lessons, I realized it was important to involve students outside of the textbook and classroom. However, our district had recently imposed limitations on the number and types of field trips students could take during school hours. The answer was obvious—we had to go during off-school hours on weekends or holidays. I decided to institute Science Safaris.

Science Safaris consisted of six excursions to a variety of locations for the purpose of generating interest in science. These excursions were completely optional, but most students wanted to participate. They were not closely tied to the content of curriculum in the class, but existed for the purpose of generating enthusiasm for and engagement in science as a domain.

Choosing a site

Living in Florida, a state that abounds in natural beauty and interesting field-trip sites, I found I could easily make a list of many exciting places my students might love to visit. But it should be apparent that good field trips exist everywhere, and that the most important criterion is that the field trip should remove students from the classroom to engage them in interesting, real-world experiences. Sites might include local, state, or national parks, local businesses, utility companies, museums, manufacturing sites, libraries, hospitals and labs, technology centers, and more. A quick internet search will often reveal a wealth of untapped community resources suitable for engaging science field trips. Checking with the local Chamber of Commerce may open up unconsidered possibilities as well.

After making an initial list, I called each site, researching what a trip there might entail. Usually the

FIGURE 1 Ideas for Science Safari sites

Destination	Activity	Description	Science standards
Florida Power & Light (FPL)	Spooktacular science	Hands-on science activities for all ages related to Halloween.	Energy, energy conversion, machines
NASA	Lunch with an astronaut	Tour NASA, see two IMAX movies, and have lunch with an astronaut.	Space, technology, history of science
Jonathan Dickinson State Park	Narrated pontoon ride	Take a narrated pontoon ride along the waters of Jonathan Dickinson State Park. See Trapper Nelson’s cabin.	Native ecosystems, natural adaptation, history of science
Indian River Lagoon—Vero Beach	Narrated kayak trip	Take a narrated kayak tour of the Indian River. See much wildlife. Have lunch (provided) on a spoil island, then return.	Native ecosystems, natural adaptation, survival of species
Florida Oceanographic Society	Making reef balls	Learn about the reef, then help make concrete reef balls for the center to sink and for marine life to use as habitats.	Ecological impact of humans, oceanographic ecosystems, scientific technology
Seacamp	Three-day trip	Explore coastal ecologies in an active, hands-on fashion.	Coastal ecologies, taxonomic classification

sites had some type of education coordinator who was more than happy to spend time on the phone, walking me through a proposed visit. Admission fees and logistical details were duly noted. It was important to research several key points:

- Could the trip be scheduled over a weekend or school holiday?
- What was the cost of the trip? How should payment be made?
- What would students be doing? How would the events of the trip “flow”?
- How many students could the site accommodate?
- What provisions for food were available on-site?
- Did students need to bring anything to the site?
- How would the trip reinforce students’ classroom science learning, or engage them in science?

After researching a number of sites, several were selected for inclusion during the academic year. A description of these sites is provided in Figure 1, a hand-out that also went home to parents. After checking with administration, it was decided that even though these trips took place during off-school hours, some type of rationale and permission form was still required for liability purposes. Any trips that exceeded 75 miles had to be approved by the Board of Education so detailed descriptions of the trips, as well as their scientific value, were submitted to the board for approval.

Planning the safaris

At the beginning of the year, a packet of information was sent home describing the upcoming Science Safaris and explaining the program. For each trip, a combination application/permission slip was also sent home and returned signed by parents (see Figure 2 for a sample). This form served two purposes: to alert the teacher that a student was interested in going on the trip, and that the student had parental permission to do so, thereby ensuring that liability was limited for both school and teacher. From that point on, only swimming and obvious risk-taking activities were off limits. Educators should check with their own school districts to understand local field-trip rules and liability issues, for they may vary. Additional information should also be gathered from students regarding health concerns such as allergies to food or stings, health conditions that might limit activity, etc.

Because the number of people I could take on each trip varied according to the requirements set by the site, some trips allowed all parents to be included, and other trips limited the number of chaperones invited.



Eighth-grade Science Safari students engage in a marine dissection.

Because I wanted a minimum of a 1:5 ratio of adults to children, if a parent couldn’t attend, that student was paired with another adult chaperone, with the full knowledge and written permission of the parent. Students were often required to arrange their own transportation to the site, so would either be brought by a parent or their chaperone. However, in a very few cases I worked with the parents to assist with transportation arrangements. Make sure to check with your own district regarding transportation guidelines.

Cost for the trips varied—some trips were free and others were pricier. I worked to make sure that every student could participate, making quiet calls to solicit funds from anonymous parent donors and PTA for our less-advantaged students. This was actually easier than it sounds—parents became so excited once they heard about the trips that I had several offers for donations. Our PTA also sponsored two students. Neither the parents nor the PTA ever knew which students they were sponsoring. Quiet, confidential discussions were held with the few students I felt could benefit from funding, and the smiles on their faces told me they were relieved.

The trips became so popular that I couldn’t take everyone. At some locations it was a matter of logistics; centers couldn’t accommodate more than a certain number of students. To be fair, on very popular trips, I instituted a lottery system. I always kept an eye toward who hadn’t been on a trip, though, and made sure that every student was able to attend at least one or two safaris, keeping a list of trips and attendees.

Science outside the classroom

Over the course of a year, my students and I journeyed through the world of science together. All of the trips, except for one which occurred over

FIGURE 2 Sample application/permission form**Dear Parents and Students,**

Our science class will be kayaking on Saturday, January 21, from 10:00 a.m. until 2:00 p.m. This exciting Science Safari will begin at Round Island Park in Vero Beach. There, we will be provided a kayak and a guide from Adventure Kayaking. We'll kayak out to a spoil island, have lunch (provided) on the island, and return.

The cost for this safari is \$20 per person, and it includes the rental of the kayak as well as the lunch. If you wish to go on this trip, please fill out the form below and staple it to a \$20 check made payable to Adventure Kayaking. In the "notes" section, please indicate who the check is for. I will hold the checks until we get to the event.

Some caveats

The company can only accommodate 40–45 people total, so if I get more than that, especially if your child has been on a Science Safari, I may have to return your check.

Because lunch is provided, if you sign up but do not come, you will forfeit the admission. They may make some allowances for foul weather, but it's not guaranteed!

Students are responsible for arranging, with your knowledge and permission, their own transportation to the event. However, if you are having a difficult time arranging transportation, please contact me at [number of school], and I'll be happy to provide assistance.

Parents and students are allowed on the trip, however siblings who are not in the program are not allowed. Thanks for your help, understanding, and cooperation.

Please detach and return with your check ASAP:

The following people will be kayaking, and the attached check made payable to ADVENTURE KAYAKING for \$20 each covers their kayaks and lunches:

Please PRINT:

Student: _____

Per: _____

Adults: _____

Home phone: _____

My child has permission to go on this trip, and I acknowledge that I am responsible for arranging transportation. I also understand that if I cannot attend the trip, my child will be under the supervision of an adult chaperone.

Parent signature

spring break, took place over weekends. We toured the Kennedy Space Center and had lunch with an astronaut. We explored the natural environment by kayak, photographing natural wildlife and identifying it back in the classroom. Working with the local environmental studies center through a small grant, we composed an illustrated trail guide for hikers to use to identify local flora and fauna. This type of practical product enabled science to have a real-life application, resulting in what Renzulli called a "Type III product" (Renzulli and Reis 1997).

One expedition found us journeying down a river to explore the homesite of an early 20th-century backwoodsman. Students cringed as they considered the living conditions and "science" this interesting fellow had to employ with no electricity—preserving meats, building shelter, housing and managing animals all became scientific challenges.

Our most popular trip was saved for my eighth graders—a three-day excursion to Seacamp. Located on Newfound Harbor on beautiful Big Pine Key,

campers took classes on marine science and could select to participate in a variety of hands-on learning experiences, including a coral snorkeling expedition, a squid dissection, and more. There was a campfire at night with counselors, and students were able to put on a science show. We had rousing renditions of the chemical elements song (by Tom Lehrer), several student compositions, and a play.

Reaping the benefits

Research has suggested that it is in middle school that girls begin to lose interest in science, resulting in girls taking fewer advanced science courses in high school (Reis and Park 2002). It was a pleasurable experience to witness eighth-grade girls, who had been absolutely positive that they wouldn't enjoy the activities, become avid proponents of the trips and develop strong interests in science.

Students who attended trips were required to write reflections of their experiences. Their reflections included the following questions:

- Describe three (new) science facts that you learned on this trip.
- What did you most like about the trip?
- What did you most dislike about the trip?
- Overall, would you recommend this trip to another student? Why or why not?
- How could this trip be improved?
- List three questions that the trip made you think about that remain unanswered. (Extra credit could be given here if the student researches the questions and answers them.)

In a seminal study on this type of metacognition, or the ability to be aware of one's thinking and learning strategies, researchers found it to be an important factor in successful learning (Brown 1987). Other research has since focused on the idea that metacognitive learning strategies such as self-explanation result in greater learning gains (Bielaczyc, Pirolli, and Brown 1995).

If this sounds like a lot of work, it was. Much time and effort were required to establish and implement the trips. More volunteers to coordinate logistics would perhaps allow more trips to be made. Volunteers would be extremely useful for contacting sites to visit, coordinating permission slips and carpools, and fundraising. (I would discourage parental involvement, however, in the distribution of funds to needy students, a task only a sensitive instructor should handle.) I would also work to solicit more donations, perhaps from community corporations, so that more students could attend the trips, and I would develop activities that might better involve students who were not able to attend a particular safari. One idea occurred to me after the year ended—asking students to bring a camera, a journal, or a sketchpad and asking them to create a “memory log” to give to other students upon their return would benefit all students and connect the student who could not attend more closely to the experience.

The benefits of bringing real science back into the classroom were diverse. We had discussions about what we saw and how it might apply to the curriculum we were learning in class. Students became aware of the importance of science in the world around them, and in many cases, they came to see themselves as “explorers” of that world. Science became a pleasurable pursuit, with several students speaking of new ambitions to pursue a career in science.

Perhaps equally importantly, Science Safaris brought us together as a group and helped us to bond with one another. Students were able to see me as a person and, without the rigor of the classroom, I was

able to relax around them. We laughed a lot on the trips and my classroom became a happy place. Even students who had not been able to attend a particular trip were engaged when attendees brought back their pictures (which we sometimes shared as a class) and relived the trip together. As a student eloquently summed it up, “I found myself looking forward to eighth period, because it was both stimulating and relaxing, a time when I could be free of stress and problems while I focused on what I enjoyed. I’ve come to love the cluttered little room...” My students and I had succeeded—we’d brought the outside world of science inside, reveling in both the process and the ability to learn from each other. ■

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