

## Teaching environmental health in a primary school in Uganda

by [David Hursh](#)

In this blog, I update readers on the first ten days of my three-week trip to Uganda. In a subsequent blog I will write about our visit to the Millennium Villages Project, a development project organized by the Earth Institute at Columbia University and the United Nations Development Program. The two medical students and I spent the first half of the trip teaching about environmental health to second through sixth graders at the Circle of Peace Primary School in Makindye, on the outskirts of Kampala.



When I visited the school last summer, I was following up on work funded by AHEAD Energy, which had paid for the installation of rocket stoves in the kitchen (stoves that when used properly emit almost no gases or particulates into the cooking area) and two solar photovoltaic electrical systems. Besides teaching, AHEAD Energy asked me if I would oversee the design and construction of a rainwater harvesting system that would supply water for toilets and showers for the 200 students, 30 of whom live at the school because they are orphans. (I posted blogs about this last summer [HERE](#) and [HERE](#).)

Last summer's lessons focused on different forms of energy, the energy cycle (it all goes back to the sun) and, so they wouldn't drain their electrical system's batteries, information on watts and watt-hours. However, developing reliable forms of energy and clean sources of water are only part of improving health. Each year, two million people in the Global South die from diseases related to smoke inhalation, largely from cooking over wood and charcoal fires. Further, thousands die daily, primarily from diarrheal diseases, caused by contaminated water. Therefore, I had planned on returning to Uganda to teach students about the dangers from air and water pollution and how to reduce their risks.

(Teaching environmental health has been a decade long but largely secret interest of mine. This interest will become more public when my book, co-authored with Dr. Camille Martina, *Teaching Environmental Health to Children: An Interdisciplinary Approach*, is published by Springer Publications in August.) Subsequently, when two University of Rochester second-year medical students, Scott Walter and Nick Zinn, asked if they could return with me this summer, given their medical expertise, I readily agreed.

The challenge for our trip was to see if we could teach students about complicated notions of air and water pollution and health risks when the prevalent approach to teaching focuses on teachers transmitting information to students and learning consists almost entirely of recall. Students are rarely asked to synthesize or apply their knowledge. Moreover, we only had, in the end, five school days to accomplish our goals. As I will describe below, I think we were partially successful.

Our goal was to teach students about air and water pollution so that they might reduce their risks. However, since we were teaching about human health, we began by teaching or re-teaching, in the case of some of the older students, about the circulatory and respiratory systems, two systems they would need to know if they are to understand the dangers from pollution.

We began by talking about the lungs, what they did and how their bodies needed oxygen, which they inhaled, and how they exhaled carbon dioxide. We noticed our breathing in and out. We then diagramed how the oxygen was transferred from the lungs to their blood.

Next we taught about the heart, including its four chambers and valves. We wanted students to become more aware of their heart and what it does, so we had them take their pulse while resting and after doing 25 jumping jacks. Typically, their heart rate increased by 50 to 100 percent.

We also brought stethoscopes and blood pressure cuffs with us so that students could listen to each other's lungs and hearts and take their blood pressure. Since the primary approach to teaching is students copying assignments off the board and then completing them, students enjoyed these more authentic activities.

We then turned to describing how air pollution could damage the lungs, showed them photos of a healthy lung and the one of a long-time smoker. We asked students to brainstorm examples of air and water pollution and then write and draw about them. Specific examples relevant to their own experience included:

- Since there is no garbage pickup for most of Kampala, almost everyone, including the school, burns their trash.
- Smoke from open wood and charcoal fires used to cook meals.
- Pollution from vehicular exhaust, including the taxi vans and motorcycles (boda bodas).
- People and animals urinating and defecating outside and near waterways.
- Trash, including food, in the rainwater trenches on the side of the road.

In order to assess how much air pollution these activities created, we placed four petri dishes, in which we had swabbed about a tablespoon of petroleum jelly, around the school grounds: one above the cook stove, one by the burning trash, one by the road, and oven covered and left in the classroom as a control to compare to compare the others with.

Three days later we examined the dishes. The jelly in the petri dishes exposed to the elements was covered with small particles that turned the jelly grey and large particulates that you would not want to breathe in. The findings were alarming to the students who became concerned over what this might be doing to their lungs.

This naturally led to talking about some of the ways they might reduce their risks and how they might inform others. We then proceeded to have the students video and photograph incidences of pollution. One group of students made up a song in which they "gave advice" on what people should do and not do. In the next few weeks we will combine the photos and videos into presentations that we will post on this website.

The extent to which we achieved our goals is unclear. The students did take photos and videos and wrote and sang about air and water pollution and what we should do to reduce our risks. Certainly, more time would help, as students could gain more experience with using cameras and a deeper understanding. It would have been useful to research other sources of pollution near the school grounds so that students would have a better understanding of what all the ubiquitous of the dangers. On the other hand, the children will long remember using stethoscopes to listen to their lungs and hearts and their growing awareness of the dangers of air and water pollution.

However, our experience brought up two larger issues: First, how can we improve people's access to clean water and less polluting forms of energy in developing countries like Uganda? Second, how might we introduce our more hands-on, Deweyan teaching methods to other schools beyond the one where we worked? In the next blog I will describe our visit to the Millennium Village Project in southwest rural Uganda.