Science Outreach in South Africa
December 2009
Funding for this Project:

International Center for Materials Research

Howard Hughes Medical Institute

Trevor Douglas (Funds from MSU Provost’s Outreach Award)

Anonymous Private Donors
Participants:

(L to R) Courtney Reichhardt (MSU undergraduate), Kevin Harlen (MSU ug), Ben Douglas (Bozeman Middle School Student), Trevor Douglas (MSU – Professor/Outreach Leader)

Front Row L to R: Ben Douglas, Anneli Kleyn (Stellenbosch ug), Courtney Reichhardt (MSU), Kevin Harlen (MSU), Back Row: James Odendal (SU – g), Leigh Loots (SU – g), Storm Potts (SU – g), Vincent Smith (SU – g), Matteo Lusi (SU – post-doc)

Chris Broomell (MSU post-doc)

Len Barbour – Professor Stellenbosch University

Not pictured:
Malcolm Applewhite (SU-g), Helene Wahl (SU-g), Leigh-Ann Wood-Pottle (S-g),

Stellenbosch University Institute for Mathematics and Science Teaching Staff: Raffie Van Wyk, Cosmos Tambara, Andrew Fair
**Location:**

Bozeman, Montana to Cape Town, South Africa = 9,680 miles, 15,614 kilometers

Cape Town to Stellenbosch: 25 miles

Stellenbosch to: Kraaifontein: 10 miles

Amstelhof: 15 miles

Kayamandi: 5 miles

**Overview:**

Three township communities were visited. Three or four schools from each community joined together at a central school (highlighted) to make up approximately 90 children between the ages of 10 and 13 (roughly grades 5, 6, and 7). Two schools were visited twice:

Kraaifontein: 1 visit X 90 students = 90 students

Amstelhof: 2 visits X 90 students = 180 students

Kayamandi: 2 visits (70 and 30 students) = 100 students

Total: 370 student contacts.
**Amstelhof** (near Paarl):

Amstelhof Primary School

Paarlzicht Primary School

Paulus Joubert Primary School
Kayamandi (near Stellenbosch):

Kayamandi Primary School

Ikaya Primary School

St Ida’s Primary School
Kraaifontein:

Brooklands Primary School

Bloekombos Primary School

Eikendal Primary School

Ekuthuleni Primary School
Overview:

Our science outreach program is about hands-on, fun activities that encourage learning (or re-learning) how to ask questions. The ability to learn is based on active play, curiosity, and questioning but, too often, we forget how to play and ask questions while striving to amass information to pass exams.

Fun

In informal activities

Engaged Participation

Anticipation

Engaged Participation
At our events, we create a relaxed, non-threatening, informal atmosphere where students are encouraged to participate, make noise and have fun. We were curious if our outreach work developed at MSU and piloted at Science Saturdays, in the public schools and on the Crow Reservation would translate to an entirely different culture and educational system. With the generous support of private individuals and scientific funding organizations who also find this an interesting question, we put together a team and started to work.

Trevor Douglas, who grew up in Cape Town, South Africa has long held a desire to return with a science outreach program directed to the traditionally underserved communities near there. As a result of 45 years of the Apartheid “separate development” government, there are underdeveloped and underserved communities, known as townships, near most developed urban areas. Outside of Cape Town, it is estimated that as many as 3 million people live in township areas. The best of these have paved roads, public sewage systems, fresh water supplies, schools and clinics. The worst of these are casual settlements of newly arrived citizens, refugees, and immigrants who are drawn to the urban areas for work opportunities.

The townships visited for this project, were of the more developed type but still were made up of very casual and substandard housing. These communities are known to have very high violent crime rates and are highly compromised by the rates and effects of HIV-AIDS infection.
The attempt was made to bring the model of “Science Saturdays” to three of these townships; hoping to meet with approximately 100 children from each community each day of outreach.

The two primary underlying goals of Science Saturdays are; (1) to encourage children to play and, (2) inspire them to ask questions; questions being the basis for learning in all areas and specifically being the basis of good science. We encourage questions by designing activities that are engaging and unpredictable. Children (and their teachers) predict an outcome and then test their predictions. Our initial activity is designed to surprise and amaze the kids; taking commonly available materials and beginning to understand their amazing scientific qualities.

The event starts with an introduction about how nature has inspired scientists. Scientists have spent a lot of time looking at naturally occurring materials such as seashells, bones, and biological structures trying to discover how to mimic some of their material properties. A familiar creature in Cape Town is the gecko. Geckos have amazing feet that allow them to climb up and cling to virtually any surface except Teflon.
All South African children have seen geckos in their environments; usually on their ceilings at night. Gecko’s feet have been extensively studied and are the inspiration for new materials.

One such product that we used for this activity is “Post-it-notes”. Everyone has seen them, but most have not marveled at their amazing ability to both “stick” to almost any surface and, importantly, “un-stick” when you want to move them. First, the children are given a few Post-it notes to play with to investigate their sticking qualities. Then, they are given a Post-it note and asked to predict how much weight they think it might hold. Invariably, the prediction is one or two washers. Finally, the children test their prediction; the Post-it notes can hold between 20 to 40 washers! Perhaps the highlight of the experiment is when the Post-it note fails and all the washers come crashing down ----- laughter and happy mayhem follow!

Questioning, learning science, looking at our environments in new ways, and most importantly, having fun! This is what our outreach is all about. If we can connect questioning, learning and joy, we have succeeded.
On the return visit to Amstelhof and Kayamandi, our activity was centered on wind energy. Most children in South Africa have experience with windmills; either attached to water pumps or by seeing the windmill farms near Cape Town. The Cape is a windy place and anyone who lives there has personal experience with the power of the wind. They were asked to predict how different blade shapes might affect spin speed and therefore, the power of a windmill. The children designed blades to attach to a hub. This was mounted on a PVC pipe windmill and voltmeters were attached. We used electric fans to test the speed that the various blades were able to achieve. They then had the opportunity to redesign their blades and test the speed again. This was a much more controlled activity than the washers, but also elicited great excitement when each student’s blades were tested.

**Summary:**

The group left South Africa feeling that the project was a success. We went into areas that are severely impoverished and underserved not knowing what our reception would be like or whether we would be able to connect with these different groups. We were warmly received. We felt that they were hungry for this type of learning and were bursting with enthusiasm at the chance for hands-on exploration. The teachers were also very enthusiastic and were often found side by side with their students participating in the activity. Many of the teachers have limited training and education themselves. We are trying to share the simple, but important, message that learning and science are about “doing” and asking questions. When a teacher designs some simple hands-on activities that inspire questioning, everyone learns more. Our next goal
when we return is to work with more children, but also to work with teachers and teacher educators and model for them the power of learning by inquiry and exploration. When this is coupled with the involvement of research scientists it is a very powerful learning experience for everyone.

Read What the Participants Had to Say:
Trevor Douglas (MSU Chemistry Professor and Outreach Leader):

South Africa is a country of staggering contrasts and sometimes mystifying contradictions and barriers. The obvious barriers between racial groups still exist but are also underscored by economic barriers that still fall largely along racial lines. I was hopeful that we could bypass some of the barriers with our science outreach efforts and not get bogged down in trying to go through the ‘chain of command’ in order to get to the children. With help from a group of science educators at Stellenbosch University (Raffie van Wyk, Andrew Fair, Cosmos Tambara), we were given access to the township schools, teachers, and most importantly, the children. Because of their help, the whole program was relatively free of bureaucratic headaches. Planning before the trip was feverish; buying supplies, trying to anticipate issues that might arise and packing everything. It was hectic but it all came together in the end. I left Bozeman on November 29, 2009 accompanied by my 12 year old son Ben, Kevin Harlen, and Courtney Reichhardt. We flew through Minneapolis and Amsterdam (where people might have been puzzled to see us attaching reinforcing tabs to hundreds of ‘Post-it” notes while waiting for a connecting flight) en route to Cape Town – a 30 hour trip in all. We arrived in Cape Town at midnight and were met by Chris Broomell and Vincent Smith (from Stellenbosch University). Kevin and Courtney were taken to Stellenbosch with them and Trevor and Ben went off in the other direction to see parents/grandparents. The next day, Trevor and Ben drove to Stellenbosch to join Chris, Courtney, and Kevin. That night, we went through our presentation and all the materials for the next day and, after a couple of glasses of wine, slept remarkably well. Our first event was held in Paarl – at the Amstelhof Primary School. Paarl is a small community nestled into the mountains in the wine-growing region outside Cape Town – very beautiful. We drove (on the ‘wrong’ side of
from neighboring schools to arrive, and they were...well, just like kids – sort of shy, sort of intrigued. They asked us questions but were most curious about Ben, who is the same age as most of them, and were especially interested in why he wasn’t in school!

We talked to the children in a broad sense about Bio-Inspired Materials – how scientists study the world around us and how, through learning from Nature, they can make new and important materials. The obvious example for this is Velcro – inspired by the burrs that cling to clothing and fur. We talked to them about geckos – there are lots of geckos in this region and the children all know that they can walk up walls and ceilings – and one of the best illustrations of gecko-like adhesion are ‘Post-it” notes. So we had them sticking Post-it notes to everything – as many different surfaces as possible – to find what was the ‘best’ surface for sticking. There were about 90 kids in a large, very echo-prone room and pretty soon the room was filled with yellow post-it notes and lots of increasingly loud shouts and laughter. I don’t think these kids had ever had this kind of ‘freedom’ in school before and the teachers all looked a little concerned about the chaos. But, it was intentional on our part – we wanted them to have fun with the exploration of surfaces. For the next part, they all sat down and were attentive as we developed the plan with them of attaching weights to the post-it notes to see just how much weight those little notes could hold. The weights were washers (50g each) and, of course, they all estimated that the Post-it would hold one or two or maybe three washers before it failed. Then, armed with some hole-punched (and reinforced) Post-its, a bunch of washers, and some wire to hang them on, they went off again (in groups) to make some measurements. When 8 or 9 washers still had not caused the adhesive to fail the tone (noise) in the room began to change to a
excited buzz and it then became clear that 90 kids were engaged and focused on getting as many washers to hang on their post-it notes as possible. Soon after that, the first ‘failure’ of the adhesives began – and then things really got noisy. When a Post-it with 20 or 30 50g washers hanging to it on a piece of wire fails, there is an enormous crashing and the washers go everywhere! The children’s delight is infectious and they try it again, and again, and again. It is a wonderful sound – 90 kids squealing with joy and thinking hard about how to get more and more washers onto their Post-it note (more means bigger noise when it fails). We saw some very inventive solutions. Our job there was pretty simple; talk to them while they are doing these activities and get them to ask questions about what they are doing. In interacting with these children, a bond quickly develops – they are wonderful, engaged, bright and curious. I wonder what the next few years will hold for them?

Afterwards, the school principal showed us the back of the school where a dilapidated fence separated the school from the surrounding community. The ‘houses’ were shacks of salvaged wood and corrugated iron sheeting and the paths between them were bare dirt. It looked sort of picturesque – but it was summer so there were beautiful wild flowers blooming and I wondered what it would be like in winter when the rains and cold wind from the sea replaced the flowers. I also wondered how they managed to emerge from those shacks with clean and ironed clothing – I can’t even manage that!
We repeated the same event the next day at a school in the township outside Stellenbosch – called Kayamandi. Once again, the housing was mostly scrap wood and corrugated iron sheet but the school was new, nice and stood in stark contrast to the rest of the community. We had another 70 children from 3 different schools – some spoke Xhosa and some Afrikaans but all of them were happy to talk to us in English. The response from the kids was similar to the previous day – reserved at first and then joyous and loud ...and very proud of their accomplishments.

After a weekend break, we went back to two of the schools and did it all again with the same children but a different set of activities. The few barriers there had been at the first meeting were gone instantly and the teachers got even more involved and participated alongside the kids – it was great to see and be a part of. I’m excited to continue this program – both in Montana and in South Africa.

**Courtney Reichhardt** (MSU Undergraduate):

This December (2009) I traveled to South Africa with others from my research group to do a science outreach project with fifth, sixth, and seventh graders in some schools in and around Stellenbosch, South Africa. We visited three different school sites and saw students from nine different schools. We were helped by students and faculty from Stellenbosch University.
We did some of the same science activities with the students in South Africa that we had previously done with both youth in Bozeman and the Crow Reservation. The two main activities that we did were exploring the ways that geckos walked on walls (we used Post-It notes instead of geckos) and making effective windmill blades. The basis of the activities was to have fun asking questions and exploring a topic, such as geckos. This shows that everyone can do science, which removes much of the intimidation associated with science and replaces it with the idea that science is fun.

It was remarkable to me how similar doing these activities in South Africa was to doing them in Montana. Kids, regardless of their political, geographic, or socioeconomic status, enjoy play. I was shown that the way we approach science outreach is, in my opinion, universally useful because we present science by using play as the medium of discourse. Also, it was exciting to see the students and faculty from Stellenbosch University gain interest and learn that they were capable of doing similar science outreach projects. Their interest and desire to potentially do similar projects was important to me, as it means that the program may have a lasting effect beyond our few visits to South Africa.

Personally, I had a wonderful time traveling to a new place and meeting new people. I was able to connect with students from Montana State University’s sister university in Stellenbosch, South Africa, as well as gain an understanding of the ways in which learning in another culture is similar to learning in my own culture. Additionally, it was fun to see how excited the students in South Africa were about the science activities.
In future science outreach programs in South Africa, I believe it would be useful to poll the students and teachers about which parts of the activities they enjoyed and found useful and which parts they did not. This would allow us to tailor our program to meet the needs of students in South Africa and most likely would also allow us to improve our other programs within Montana. Overall, I thought the program was successful. The students in South Africa seemed genuinely excited about science and seemed to enjoy the activities. The students and faculty at Stellenbosch University seemed as if they would like to continue to do similar science outreach projects even in our absence. Also, I was able to learn about the similarities and differences of approaching and learning science between South African culture and my own.

NOTE: As part of a Sociology Course Courtney was involved in at MSU, she completed a survey with students we worked with in South Africa. We include it here to provide additional information on student attitudes towards science education in South African Townships:

Upon completion of the activities, a few students were asked individually to participate in a survey in which they were asked whether they agreed or disagreed with statements about their interest and enjoyment in science activities.

In response to questions about whether they enjoyed completing science projects and whether science was interesting to them, both male and female students were very positive. These findings suggest that the science outreach activities were enjoyable and interesting to all the students polled.
When asked about the importance of being ‘accepted’ by male or female peers or their teacher the findings were quite different between male and female students. The above findings suggest that it is important to both boys and girls that they are liked by their same-gendered peers and that both girls and boys want to be well-liked by their teachers. The above findings suggest that girls are especially concerned with how both boys and girls view them. This is consistent with observations in which girls expressed ideas independently when in all-girl groups.

The question of whether or not science would most likely be a part of their jobs when they grow up showed that in general, the students did not believe that science would be a part of their futures.

On the issue of competitiveness the findings from this poll showed that both girls and boys are competitive about science, but the boys are definitely more competitive than the girls.

Based on these data there are some clear issues that we should (and will) pay attention to in designing the next round of outreach activities.
The findings on gender awareness and perception suggest that, as instructors in the science outreach program, we should consider interacting primarily with students of the same gender. This might encourage stronger interest and involvement in the activities. It may be interesting to see if students were more or less likely to voice their own personal thoughts during the science activities if they were in gender-based groups.

To improve the impact of the science outreach program on the children’s lives and engender a sense of how science will impact their futures, we propose that future programs better incorporate projects that the students could try again on their own and apply the results of these experiments to their everyday lives.

The findings on the competitiveness are encouraging because there was an aspect of competition incorporated into our science activities (ie: who can hang the most washers from a sticky-note; who can build the best windmill). I believe that using competition most likely increases involvement in the science activities and should be continued in future outreach programs.

Kevin Harlen (MSU Undergraduate):

In December of 2009 I was part of a science outreach group that traveled to South Africa to work with students from townships located near the city of Cape Town. The outreach team consisted of members from both Montana State University in Bozeman, Montana as well as members from Stellenbosch University in Stellenbosch, South Africa. I was one of two undergraduate students who traveled from Bozeman to South Africa. The other members of the group from.
Bozeman consisted of a post-doctoral researcher, a professor, and his 12 year old son.

The science outreach programs and experiments that were performed in South Africa were based on the very successful Science Saturday program that takes place here in Bozeman. Science Saturday is a science outreach program that invites students from the local communities to come to Montana State University to partake in hands on, inquiry based experiments. This type of science encourages learning through the asking of questions as well as the exploration of ideas or curiosities. This type of science activity is not only a very unique way to explore science, but it also allows students to uncover knowledge or ideas on their own as opposed to reading it in a book or simply being told. During our outreach events in South Africa, we used the same hands on, inquiry based approach to both teach and excite the students and their teachers about science.

The outreach events took place in three different townships and each event had about three schools from the area attending. We visited these schools twice, each time performing a different experiment with the students. The first time we used sticky notes and weights to explore how geckos can walk up the walls and run along ceilings. The second day we explored the power of wind energy by having the students construct propellers for wind turbines and then test them to find which designs produced the most energy when attached to miniature windmills. The students we worked with were middle school aged children, grades 5-7. I think working with these students was very important because they are
old enough to understand and grasp the concepts we are teaching them but not old enough to the point where they have lost their curiosity for the world around them.

When we first began the activities, the students were very tentative and a little nervous. We were instructing them to move around the room putting sticky notes on different surfaces and to explore the sticky note’s properties by essentially playing with it. This was very different from the very structured and ordered school day that they normally lead. However, once we began to encourage them to find interesting surfaces and find out which surfaces worked best, they began to open up and pretty soon they were wandering all around the room sticking the sticky notes to everything they could find. They then had fun seeing which surfaces could hold the most weight before the sticky note fell off. By the end of the session, the students were asking tons of questions and getting very excited about how much weight a sticky note can actually hold. When we came back for the second session with the propeller blades, the students were still excited from the last experiments and they dove right in, which was very encouraging to us. This indicated that the students had not only become comfortable with us but that they were also excited to do more science. The teachers that were working with us also had a similar initial and secondary reaction. When they first saw their students roaming the room and sticking little pieces of paper to the walls, windows, and doors, they were a little nervous because they normally kept a very ordered and structured classroom. However, when they saw that the students were not only enjoying the activity but also learning from it they began to get excited. Pretty soon the teachers were participating in the experiments and exploring the sticky notes right along side the students. By the second experiment, the teachers were just as excited as the students and they even challenged the students to see who could build the best propellers for the windmill; of course the students won.

The outreach experiments and activities went better than anyone had expected. We came to the schools hoping to make contact and perhaps establish a foundation for future outreach. We not only accomplished this but, I think we also encouraged these students to begin to explore
their world and helped them to realize that science is a dynamic and exciting field that exists not only in text books, but in their world as well. I think this outreach event has helped these students to see that science, or any field for that matter, is wide open and that anyone can be a scientist; all they need is curiosity or a question. From there, they can begin to explore these questions and that alone is a valuable asset.

This experience has also been one that has had a significant impact on me. I have always enjoyed participating in these science outreach programs because it gives me the ability to share my passion and interest for science with other students, perhaps in hopes of sparking their own curiosities in science or simply the world around us. This trip not only gave me the opportunity to continue my work in science outreach, it also gave me the opportunity to work with students from a culture that is very different from my own. In working with these students, they have taught me just as much as I have taught them. I learned, well attempted to learn, some of their language, I got to experience their culture, and I was reminded of all the things that I take for granted living where I do. But perhaps the most important thing I learned is that the passion for knowledge is universal. The desire to understand our world and to ask questions and seek answers is the same no matter where you are, be it Bozeman, Montana or a township in South Africa.

**Ben Douglas** *(Bozeman Middle School Student)*:

I went to South Africa with my Dad and three people from his lab. Before I went into the townships, I was really nervous. I thought I was going to want to stay at my grandparent’s house while they went into the schools, I was really wrong. The night before the first day I was super antsy. In the morning, I mustered up enough courage to go with them. When I arrived at the school, Amstelhof Primary School, I
was unsure how to act. I started talking to some of the boys. They wanted to know everything; how big was my house? School? Town? Did I play sports? Which ones? Did I have a big TV? Did I play video games? Which ones? Etc. I realized that they are just like my friends; just kids interested in things around them. When we started, someone told us that the students would be reluctant to interact; boy where they wrong! They jumped right in sticking Post-it notes everywhere! We had a hard time getting them to move on to the next step. When we did, the excitement doubled if not tripled. One of the things I would change is to have A LOT more washers. Kids kept coming up to me asking if I had more “circles”. The next day, at Kayamandi School, the kids where more stiff at the start then warmed right up and where more engaged then the first. I had the camera that day so kids would sprint across the room to get me to take their picture. The third school, Kraaifontein, will probably stay in my mind forever. It started out the same, all of them into what we were teaching.

Afterwards, some girls came up to me and said they loved me and that I look like Zack Efron. They all wanted their pictures taken with me. I still get teased today from my Dad about it. On the first day, the students seemed almost a little scared. My Dad told us that these cultures almost never mix and have almost no relationship. This seemed a little weird at first but then made sense. I was surprised at the poverty. I had heard about it but seeing it first-hand is way different. Even though the houses don’t look very nice from the outside, they actually are not that bad on the inside. I met a few boys at the second school and got their addresses. I am going to write to them.
I spent Christmas in SA; it was very different than what I was used to. It has less decorating and more being with family. It was very strange at Kayamandi; the school did not fit in its surroundings, it was really nice! There was one boy that I remember the most. We were at the first school but he only came the second time we visited. He was very nice to me, he toured me around the school introducing his teacher to me and his friends; Earl, Lesley, and Wilmore. His class had about the same number of kids as mine in a room about half of the size of one of our regular rooms. All of the kids there stared at me like I had an extra head on my shoulders. They all play a sport; mostly soccer. Most people misjudge the poverty. Lots of people in the world think that just showing up for school is good enough; but, it is not that way at all. Africa has one of the highest attendance rates but one of the lowest achievement rates. Kids need to learn in a different way when they are at school.

Chris Broomell (MSU Post-Doctoral Researcher):

In December 2009 I took part in the first round of science outreaches in South Africa. The team consisted of a small group of scientists from Bozeman (of which I was a member) along with a group of scientists and educators from Stellenbosch University. Together we held 5 events, hosting over 400 students from the townships and traditionally “under represented” areas near Cape Town. These events were inspired by and framed on the Science Saturday model established at Montana State University over the past 18 months and were based on the concept of learning through hands-on, inquiry based activities. Below are listed a few thoughts and impressions of my time there.
“Play”-based science education translates:

I was the first member of the Bozeman team to arrive and was able to see some of the areas we would be visiting beforehand. To be honest, based on these initial encounters my expectations for success were quite low. This had nothing to do with the people involved but, rather, on the significance of the obstacles before us. Poverty and politics – South Africa is a country of incredible contrast, with multi-million dollar homes ten minutes from schools where a headmaster had to threaten to burn their trash in the streets before administrators would provide basic teaching materials. Communication – though most of the students speak at least some English, their primary languages are Afrikaans and Xhosa. Disparate cultures – Although we have had tremendous success with this model in “middle America” this would be the first time we were attempting it in a dramatically different landscape. This wasn’t only true for the American contingent as almost none of our South African counterparts had themselves set foot in the townships or had any significant interactions with students from this background. All in all, after my first visit to the township, I felt overwhelmed with the challenges to making connections and leaving with anything more than a sense of “at least we followed through with our plans”.

And then we started playing.

A typical session begins with an introduction presenting a question that is intriguing to “scientists” and “non-scientists” alike, for example, asking how a gecko is able to run across the ceiling (geckos are a familiar sight to South African children…and significant resources have been dedicated by “scientists“ to elucidate the mechanism by which they are able to selectively attach to almost any surface). A basic experiment is proposed to explore this question using Post-It notes and weights but very few rules are given; the goal is to get the students to explore this phenomenon armed with their own curiosity and insight. They are set
free to explore and test and, although they are initially reluctant to move around and experiment with the supplies (Did we explain well enough? Perhaps the lack of structure is too much, too soon considering their educational upbringing?) within a short time their creativity (and energy!) takes hold and the scene evolves into “chaperoned chaos” as they start to discover the parameters of the experiments themselves. Hypotheses are made (there’s no way this sticky note can hold 2 washers) and shattered (OURS HELD 36!!!) and *they are getting it*. Trying different surfaces, different configurations of Post-It notes and washers all without explicit guidance from a teacher. And this is actually effective in promoting interaction between student and teacher. *They* feel empowered by their success and aren’t rebuffed when something doesn’t initially work and they are secure in sharing what they’ve observed with us (in whatever language...English, Xhosa, or pointing and smiling). In the end, of course, effort is made to bring the focus back to a digestible scientific explanation of what they just did (and the relevance of geckos and Post-It notes) but that is not the main point. The goal is to foster their curiosity by encouraging them to observe and ask questions about the world around them. To encourage them to take chances and realize that discovery isn’t so much learning what is already known as deciding “how are we going to find out...?”

*There is a need, people are motivated, and we’re on track!*  
One of the benefits of my extended stay in Stellenbosch was the additional time that I had to interact with several local educators and professors. Almost all of the people that I spoke with had been involved to some degree with our outreaches and it was incredibly valuable to get additional feedback about their experience and thoughts for how the program could best progress. Without exception everyone recognized the need for the type of “intervention” that we were proposing. Though no longer under the thumb of Apartheid (where inferior educational quality for the “under
represented” WAS the program) its effects are still very much entrenched. Educational opportunities now are generally determined by a family’s economic power; for most of these children the outlook is incredibly bleak. There are programs in place to address this although they have not yet gained momentum and, to be honest, many people doubted whether the programs’ methods are suitable to rectify the situation. It is important to note that this is not a problem endemic to South Africa; we have had conversations with many educators and academics in the US who recognize the need for an evolution in the way that science is taught. This is where we come in, not with THE solution, but with an alternative paradigm for instruction. We are in an interesting position of trying to work within the local system to augment curriculum while, at the same time, introducing novel concepts. Not so much with respect to the science (information) itself but, rather, with the means by which the instruction and learning take place.

Everyone with whom I spoke expressed significant interest in helping. There was, however, a broad spectrum of thought on HOW they could help. Some were motivated to go to the townships and interact with the students and some were motivated to provide logistical and material support. This is not to be unexpected as it reflects the diversity of personalities, skills and interests of the community. An important part of our outreach is to “collect” people who are similarly inspired and help them to become involved in whatever capacity they feel best reflects their abilities and interest. For example, one professor expressed that he felt he could contribute best by improving the quality of basic science at the local university. While he wasn’t sure how much he could contribute to developing curriculum, etc., he was open to the possibility of a mentorship role, perhaps hosting a teacher in his lab to participate in a short-term research project. By involving this teacher in research they can become empowered to return to their community/school with first hand knowledge of “real world” science and a taste of the hands-on learning approach. It is notable that everyone suggested that to have a significant impact on education in South Africa it would be essential to target teachers. To this end we are planning sessions for local teachers (similar to the initial events but with an added emphasis on methods, etc.) to our next outreach.
The general consensus was that the initial outreach was a success. Participants were impressed with the level to which the students (and teachers!) engaged and we received important feedback about how we can adapt our program for the next series of events. Importantly, we have begun relationships with a diverse group of people at all levels – undergraduates, professional scientists and academics, professional educators and administrators – who share a common desire to reach the next generation of South African children by empowering them through education.

“Education is the most powerful weapon which you can use to change the world.”
Nelson Mandela