What is Solar Cooking?

Children Create Solar Solutions  
by Rowena Gerber

Visit the Abess Center for Environmental Studies at Miami Country Day School during the spring and you may well find the outside entrance may be littered with a strange assortment of foil-lined shoe boxes, pizza boxes, tires and sawed off garbage cans. Closer examination will reveal lunches being cooked in these magic containers: nachos with cheese, chicken teriyaki, fish, soups, ribs, or pizza. "Solarbrations" take place several days a week at the end of this unit of study.

So, how old are these scientists, scriptwriters, journalists, business executives, and botanists? Ages four to twelve. Granted, the four-year-old will most likely hand you his super melted crayon biscuit he made in his "sun trap," but with this spiraling, project-based curriculum, that same child will be designing his own unique solar cooker by the age of eight.

ACES background
The Abess Center for Environmental Studies is an enrichment/resource program at Miami Country Day School. Using a project-based curriculum (http://www.bie.org/pbl/overview/diffstraditional.html), students actively participate in authentic learning experiences (not mimicked, contrived lessons) as scientists, researchers, journalists, nutritionists, authors, illustrators, poets, gardeners, teachers, scriptwriters, broadcasters, cooks and young, socially conscious entrepreneurs. This inquiry-based method provides fascination for most children.

How can a shoebox or tire be transformed into one of these magic boxes that heats up to 121°C (250°F) simply using the sun? The children do not just want a quick answer. They have a passion to understand the process. "Why, how come, what if, let's try it again, now let's try this, do you think this will work?" These phrases indicate meaningful, high-level thinking and reasoning. Students are constantly communicating as they build on experimental evidence, analyze, predict, interpret results, and develop questions.

Questions
How does a solar cooker work?  
What traps heat?  
What traps heat best?  
What colors absorb heat?  
What time of day is best for solar cooking?  
What are some recycled materials we can use to make solar cookers?  
Do we need insulation?  
What can we use for insulation?  
Can air be an insulator?  
Which type of cooker heats up the fastest?  
Which type of cooker stays warm the longest?  
Which foods cook best?

How can we keep food hot when the sun goes down?  
How can we change salt water into fresh water?  
Does solar cooking speed up the desalinization process?  
Which countries would benefit from solar cooking and why?  
How can solar cookers save lives?  
Could we use solar cookers in our own homes?  
What is the difference between passive and active solar energy

Naturally, answers to all these questions lead to more questions, which is exactly why we ask them. We set up materials for experiments so that the children can discover the answers to these questions themselves.
"Remember also that each time one prematurely teaches a child something he could discover for himself, that child is kept from inventing it, and consequently from understanding it completely."

-Piaget 1978

**Assessment**

Throughout the mini units and lessons in the solar cooking project it is important to evaluate the learning that is taking place. Are the children setting up independent variables for fair tests? Have they been given ample opportunities to make meaningful connections, discover, explore and extend? Do their ovens show evidence of understanding? Have the children been allowed to demonstrate what they have learned in a creative way?

Our assessments are designed to improve understanding, not audit performance. We follow many of the ideas of Grant Wiggins, who writes, "Only by ensuring that the assessment system models genuine performance will student achievement and teaching be improved over time." (Wiggins is president of Relearning by Design, [http://www.relearning.org](http://www.relearning.org)).

The assessment is genuine, user-friendly, and the goal is to aid teaching and understanding. We ask questions such as, "Draw me a diagram, explain why you think this cooker is not working, why are our pans black, thin metal, could we cook in glass containers?" All of these are quick assessments that demonstrate learning and the quality of the response generally shows evidence of higher level thinking. Other assessments used are portfolios, presentations, webcasts, Powerpoint presentations, and the effectiveness of the child's cooker.

Teachers who are required to list science standards that are being covered in their science units are invited to visit the Miami Country Day School website. Sample lesson plans with corresponding standards are listed for your convenience.