

**WATER BOTTLE SKYLIGHT MODULE**

By Joseph Sanford and Heather Slater

(wdginc@gmail.com /hwslater18@gmail.com)

**DEMONSTRATION/DISCUSSION**

**Educational Goals**:

* Learn how free sunlight can be used to light up interior spaces
* Learn about how Third-World cultures innovate with simple ideas
* Understand the simple physics behind light reflection and refraction
* See how very uncomplicated solutions can make great changes in peoples’ lives
* Learn critical thinking skills for solutions in student’s own lives

Ov**erview**: This topic shows how creative entrepreneurship provides elegant solutions for people in Third-World countries to enhance the peoples’ homes and work situations. Using a discarded clear soda bottle, 2-liters of water, an ounce of chlorine bleach, and a piece of corrugated steel, this man in the Phillipines is helping ordinary people live largely in their homes during the day. This is not limited to the Phillipines by any stretch, but it shows how simple a solution can be derived with some critical thought and problem-solving skills. Other solutions might have included raising the roofs off the walls a bit to allow side light and air circulation, changing the steel roofing for acrylic (assuming that was available), or breaking the roofs into two parts, allowing an open band for light to enter between them.

**Content:** Students will watch the video in the power point to see the concept revealed. Then, using the materials below, the class will build one water bottle skylight, put it into a closed box, and observe how the light is directed into the box from above.

**Time**: Approximately .5 hour to do the power point and discuss the concept, and .5 hour to fill the bottle, cut a hole in the box, place the light, turn it on, and observe the results.

**Materials Needed**:

* Small clear plastic bottle (20 oz. minimum to 2-liter size maximum) with cap
* Knife or scissors to cut the hole and a pen to mark the size (remember to cut smaller than the bottle diameter)
* Medium-sized cardboard box with flaps, big enough to allow water bottle chosen to penetrate and hang in middle of space
* Water to fill water bottle
* Bright light source which can be placed above the bottle so that the light covers the entire upper surface (no flashlights unless that is all you have)

**Directions**: Go through power point and have kids read most of the slides. Then fill the water bottle with water, seal, and set it aside. Then set the cardboard box on a table somewhere high enough for everyone to see it clearly, with the flap side towards the students. Then show the inside of the box to the students before the skylight is installed.

Cut a hole in the top of the box just a bit smaller than the diameter of the bottle, and install the water bottle half-way into the box with the cap side up. If you use a two-liter bottle, which is quite heavy, take another piece of cardboard from one of the small flaps, cut a hole in it to match the bottle, and tape it securely to the bottle half-way down the side. Then place the bottle down to the cardboard you just taped on. Place the light source above the bottle (with the light turned off). Then, showing the inside of the box towards the students again, turn the light on and show them how the light from above is directed, through refraction and reflection, down into the box to light up the inside and make it more livable.

**Topics to Discuss**:

Discuss thoughts and questions about the needs and issues in Third-World countries;

Talk about critical thinking and problem solving skills using materials in hand;

Share thoughts about light reflection and refraction and how the concept works;

Introduce the concept of entrepreneurship (conceiving of and starting a business) and its benefit to society in creating opportunity, jobs, and solving problems;

Ask how recycling the bottles had a two-fold impact on the environment ( 1) kept the bottles out of the landfill or local streams, etc. and 2) reduces the need to turn on lights in the day, thus conserving energy, using less coal, etc.);

Also discuss how adding light impacted the personal economics of the people living there (able to work inside during daylight hours, allowing them to earn more money for better lives, as well as saving them money since they did not have to turn on expensive lighting);

Discuss how these skylights changed the lives of the people in the video for the better (economic, physical, social, psychological, and health benefits);

Lastly, ask the students to consider how they can solve problems around them in simple ways

M**entor Notes**: This is a really simple experiment. Mostly it is a chance to show a really cool, simple idea which we hope will inspire the students to think about how they could solve problems around them simply. There is really nothing for the kids to do, but you could involve them by having them fill the water bottle, cut the hole in the box, place the light and turn it on. Of course, getting them involved in the discussion is the main thing and helping them to see that THEY can be useful as much as anyone else in coming up with solutions which help people live better lives.