Table Set-up with equipment

Comparing the Properties of Light from Various Types of Bulbs (Incandescent, compact florescent, LED …) Using Modern Engineering Tools

Target Audience: Parents of elementary school students (grades 3-6), Middle and High School Students

Objectives:

1. Introduce the Mobile Studio as an example of a modern engineering measurement tool
2. Introduce the range of light bulb options available for home use.
3. Describe the specifications generally provided to the consumer to evaluate available bulbs for home use
4. Provide hands-on experience with the measurement of the time-dependence of light output from three or more light bulbs based on significantly different technology (e.g. incandescent, CFL, LED) as an example of information on light bulbs that is not generally provided for consumers.
5. Provide interaction with engineering students.

BOM: Mobile Studio with computer (one for each table), solar cell, three or more 40 watt equivalent bulbs (about 400 lm), 3 or more simple reflector lamps (clamp on) for display of bulbs (desk lamp is good because of the length of the support). Table of lamp specifications for a variety of standard bulbs available from national chains (e.g. Lowes and Home Depot – see attached), including price, lumen output, predicted hours of operation, … List of online information on light bulb performance.

Item	Source / website	Price
Mobile Studio	https://sites.google.com/a/mobilestudioproject.com/www/	Approx. $150.00 each
LED Bulb 40 Lumen equivalent (Sylvania)	Lowe's or Home Depot	Approx. $22.00 each
Compact Fluorescent Bulb 40 Lumen equivalent (GE)	Lowe's or Home Depot	Approx. $6.50 each
Incandescent Bulb 40 Lumen equivalent (Sylvania)	Lowe's or Home Depot	Approx. $.50 each
Table desk lamp for 40 watt / lumen bulb	Lowe's or Home Depot	Approx. $12.00 each

Set Up: For a round table, set up the three lamps each with a different type of bulb spread equally around the table (clamped onto the edge of the table). Position the computer in a central location so that the Mobile Studio board can reach each of the light fields from the three lamps.

Activities:

1. Introduce mentor(s) and general purpose of activities
2. Discuss light bulb options and generally available information
3. Introduce engineering measurement and the Mobile Studio
4. Use the Mobile Studio to measure the time-dependent light output from three or more readily available light bulbs.
5. Discuss what has been learned about light bulb options.
6. Take general questions on the experience of being an engineering student

Outcomes:

1. Audience will be better informed about their home lighting options.
2. Audience will be able to provide an example of how engineers approach problem solving and/or the development of a new product.
3. Audience will be better able to understand and appreciate the other activities offered at the event, especially the one on the color of light.
4. Audience will be better informed about the properties of light, Smart Lighting and its potential to impact the quality of their lives through the generation, sensing and control of light.
5. Audience will have an increased understanding and enthusiasm for what engineers do and for an engineering career.
6. Audience will visit the website of the Smart Lighting ERC.

Takeaways:

Either a handout with the list of online information, light bulb specifications, etc. and a single link to all information online. The latter is a mechanism for encouraging the interested public to visit the website of the Smart Lighting ERC. The link provided should also help connect the audience to information on engineering, engineering careers, and K-12 STEM education. http://smartlighting.rpi.edu/index.shtml

Resources:

The major resources required for mentors or for self-guided exploration are included in the handouts except for instruction on how to use the Mobile Studio. This information is available on the Mobile Studio Project website mobilestudioproject.com. It is assumed that the mentors are engineering students, preferably from Electrical Engineering or practicing EEs. However, anyone with some practical experience in electronics can also be a mentor.