

Design a Light Shield Activity

This activity is adapted from the Dark Sky Rangers activity here:

https://www.globeatnight.org/dsr/dsee/Dark%20Skies%20Activities/Demonstrating%20Light%20Pollution%20and%20Shielding%20Activity/Light_Shielding_Lab.pdf

This adaptation is inquiry based and provides an opportunity for the participant to engage in an engineering challenge by designing and creating a model of a light shield made for a model streetlight.

Objectives:

To introduce the concept of light pollution

To introduce the impacts of light pollution

To provide the opportunity to engage in an engineering challenge by designing and creating a model of a light shield made for a model streetlight

To introduce the concepts of glare and light trespass as well as the impacts of light pollution

To introduce the solutions to light pollution

Materials:

City Skyline backdrop of your choice (not necessary but a nice addition)

1 Mag-Light, flashlight with a removable cap that exposes the light bulb. A string of christmas lights can work as well

Paper lunch sack (1 per student)

Sack is filled with the following materials:

2 pipe cleaners

1 toilet paper tube

1 piece of aluminum foil

4 straws

2 popsicle sticks

(materials can be adapted to be a certain amount of recyclable materials or materials found at home)

Access to:

Duct tape or tape

A glue gun and glue sticks (if possible)

Steps:

1. Engaging and framing the activity:

Introduce the concept of light pollution by assessing what the participant knows. Questions can be: What living things come out at night? Have you ever looked through a telescope? Have you ever seen the Milky Way Galaxy? Can you see the Milky Way from where you live?

To introduce the concept of light pollution, here are links to explanations with associated videos of the impact of light pollution on: [seeing our night sky and our Milky Way galaxy](#), [human health](#), [wildlife](#), [energy use](#) and how it causes [dangerous glare](#). You can refer to the [International Dark Sky Association website](#) for an introduction to light pollution which includes a short video which is great for ages 8 and up called 'Losing the Dark'. Also, a good introduction to light pollution and proper night sky friendly lighting and more can be found at the [Hill Country Alliance Night Skies](#) webpages.

Next, invite the participant to look at the backdrop city skyline environment you have set up with the flashlight according to the videos below:

For my blog post showing photos of the backdrop and a short video of the activity in action, visit: <https://www.starryskyaustin.com/texas-night-sky-festival/>

For a video of an updated skyline/backdrop with short explanation visit: https://www.starryskyaustin.com/wp-content/uploads/2020/08/IMG_0360.mov

Another video of a similar set up with backdrop from Dark Sky Rangers curriculum page: <https://youtu.be/XTjR4vef8JU>

Explain the environment and show how the model streetlight is producing glaring light which decreases visibility of the night sky. Tie in what they learned about the impacts of light pollution above.

2. Design a Light Shield

After explaining what light pollution is, it's time to design and build a light shield for the model streetlight using a flashlight. I frame this as an engineering challenge and ask the participant to only use what materials are given. I give them access to the material list above as well as tape,

duct tape and glue sticks and sometimes incorporate recyclables from our recycle bin. Supplies can be adapted as needed.

This is an opportunity to allow the participant to use trial and error as well as problem solving skills to design something that allows the model street light to shine down to the ground to decrease light trespass and glare. I only guide them when needed and allow them to struggle a little in order to come up with a design that works. Once they finish their design we discuss if it shines the light down where it is needed or if it trespasses into places where it is not needed and how they can change their design so it is dark sky friendly.