



Innovation Month

## Engineering Brightness -

Bringing Students, Businesses, and Communities Together to End Light Poverty

### Age Range

5<sup>th</sup> grade and up

### Time

### Commitment

30-45 minutes

### Learning Targets

**Collaborative Problem-Solving:** I can work with students, business professionals, and community members to design and implement sustainable solutions for light poverty.

**Real-World Application of Skills:** I can apply engineering, entrepreneurship, and creative thinking to develop solar-powered lanterns that make a meaningful impact.

### **Social Responsibility & Global**

**Awareness:** I can recognize the importance of using my unique talents to contribute to real-world challenges and understand how collective action can create lasting change.



Light is crucial to how we survive and thrive as humans. Without access to light, schools wouldn't be able to teach students. Hospitals wouldn't be able to treat patients. Dentists wouldn't be able to work with accuracy. Businesses wouldn't be able to run effectively. Think about how a lack of electricity might affect your nightly routine. How it might affect your sense of safety. We enter a room; we flip on a switch – sometimes even when we don't necessarily need to! Light is something we have such easy access to, it's difficult sometimes for us to even think about how much our lives depend on it. It's hard to wrap our heads around just how much we rely on something as simple as a tiny 4-inch lightbulb.

In 2022, 100% of the U.S. population had access to light. That's a far cry from the 47% of the people residing in Uganda. Or the 32% of people in Liberia. To put that into perspective, that would be like only 8 of the 25 students in your class having access to light.

Engineering Brightness (EB) is a movement that unites people of all ages and backgrounds to tackle light poverty, a crisis affecting 1.3 billion people without reliable electricity because of the infrastructure, high cost, or insufficient housing. This intergenerational initiative brings together students, educators, business professionals, and community members to design and build solar-powered, 3D-printed lanterns for communities in need. Learning doesn't happen in isolated classrooms or silos—it thrives through real-world collaboration. By combining technical skills, creative problem-solving, and entrepreneurial thinking, EB creates an authentic experience where everyone's unique talents contribute to making a lasting impact.

Engineering Brightness is a call to action for communities everywhere. Whether you are a student eager to learn, an educator looking to inspire, a professional with expertise to share, or a supporter wanting to contribute, there is a place for you in this movement. By joining forces, we can shine a light on the issue of energy poverty and bring hope to those living in darkness. Every skill, every effort, and every voice matters—because together, we can engineer a brighter world for all.

## Get Inspired

Since 2013, over 1,000 students have participated in Engineering Brightness. Through their hard work, over 1,500 lanterns have been shipped and even hand-delivered to countries around the world, helping those who do not have access to light.

Bringing light to the world is essential. Doctors performing surgery at a local clinic in Liberia found this out firsthand. When the electricity went out midsurgery, the room was pitch-black. A few student partners who had received solar lanterns from Engineering Brightness heard the surgeons needed light to complete the surgery. So, the students went home and immediately brought back their lanterns and the doctor was able to complete the surgery!

In Guatemala, a group of businessmen were meeting when the lights went out. A young girl who lived at the house brought the lantern that she had just made that day for them to use. The men were able to finish their meeting. They were so impressed; they encouraged the girl to follow her skill in electrical engineering. In doing so, she was the first female to attend school for electrical engineering in her city!

## Your Challenge

Your challenge is to determine how you can take action and contribute to ending light poverty. One of the most urgent needs is printing 3D files for lanterns like what Engineering Brightness builds, a critical step in creating durable, solar-powered lights for communities without reliable electricity. If you have access to a 3D printer or know someone who does, your skills can directly contribute to making these lanterns a reality. But even beyond printing, there are many ways to get involved—whether through engineering, business outreach, fundraising, producing a video, or spreading awareness. Everyone has a unique role to play in this effort, and your contributions, no matter how big or small, help bring sustainable light to those who need it most.

Making a difference starts with taking action. You can help by printing and assembling lantern parts, designing new 3D models to improve efficiency, or collaborating with local businesses and schools to expand access to 3D printing resources. If you don't have technical experience or access to resources, you can still make an impact by organizing community print-a-thons, securing funding for materials needed to build solar powered lanterns, or mentoring students as they develop their skills. Change doesn't happen in isolation—it happens when people come together to solve real-world problems.

How will you use your 3Ts—time, talent, and treasure—to make a difference? Whether you donate time by educating your peers, contribute your talent by helping build a light source, or use your treasure to fund materials and equipment, your support is vital. Perhaps you can dedicate time to spreading awareness, find creative ways to improve current lantern designs, or connect with businesses willing to sponsor supplies. Every contribution, no matter the form, brings us one step closer to ending light poverty. Now is the time to take action—how will you help shine a light in the world?

Want to see all the hard work students are doing with Engineering Brightness? Check out this YouTube video: <https://www.youtube.com/watch?v=SJzBoRrW0>

## Website Resources

**Engineering Brightness:** <https://philanthropic-engineering.org/>

**Lighting Global (World Bank Group)** – <https://www.lightingglobal.org>

A World Bank initiative supporting off-grid solar solutions to improve energy access worldwide.

**United Nations Sustainable Development Goal 7 (Affordable and Clean Energy)** –

<https://sdgs.un.org/goals/goal7>

Provides global insights on energy access and efforts to expand clean energy solutions.

**International Energy Agency (IEA) – Energy Access Data** – <https://www.iea.org/topics/energy-access>

Offers reports, statistics, and policy insights on global energy access and electricity shortages.

**The World Bank – Energy Access** – <https://www.worldbank.org/en/topic/energyaccess>

Covers research, projects, and statistics related to global electricity access and energy poverty.

Websites with information on the dangers of using **candles, kerosene lamps, and open fires indoors:**

### Health & Safety Risks

**1. World Health Organization (WHO) – Household Air Pollution**

[https://www.who.int/health-topics/air-pollution#tab=tab\\_2](https://www.who.int/health-topics/air-pollution#tab=tab_2)

Discusses the health risks of indoor air pollution from kerosene lamps, open fires, and solid fuel use.

**2. U.S. Environmental Protection Agency (EPA) – Indoor Air Quality & Pollution**

<https://www.epa.gov/indoor-air-quality-iaq>

Covers indoor air pollution sources, including burning fuels like kerosene and wood, and their health effects.

**3. Global Alliance for Clean Cookstoves (Clean Cooking Alliance)**

<https://cleancooking.org>

Highlights the dangers of household air pollution and promotes safer alternatives to open fires and kerosene lamps.

### Fire Hazards & Accidents

**1. National Fire Protection Association (NFPA) – Home Fire Safety**

<https://www.nfpa.org/Public-Education>

Provides statistics and safety guidelines for fire hazards related to candles, open flames, and indoor burning.

**2. Burns and Fire Safety – World Health Organization (WHO)**

<https://www.who.int/news-room/fact-sheets/detail/burns>

Explains the risks of burns from open flames and unsafe lighting methods used in homes without electricity.

### Environmental & Economic Impact

**1. World Bank – The Hidden Costs of Kerosene as a Cooking Fuel**

<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/>

Examines the environmental, financial, and health costs of kerosene and other traditional fuel sources.

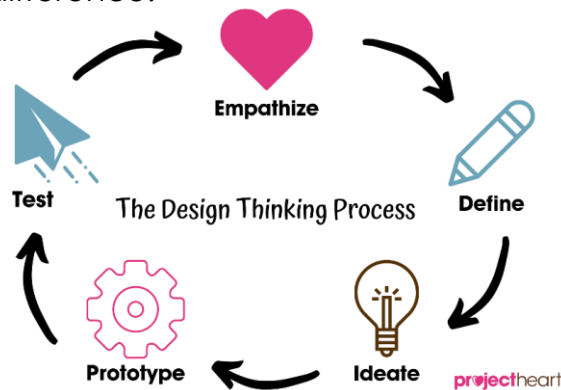
**2. International Energy Agency (IEA) – The Dangers of Energy Poverty**

<https://www.iea.org/reports/world-energy-outlook-2021>

Discusses how reliance on unsafe lighting and heating fuels contributes to energy poverty and climate challenges.

## Getting Started

To effectively create change, you need to follow a plan of action. We use the Design Thinking Process to help us better understand the problem we see and walk us through steps to creating a plan to make a difference!



## The Design Thinking Process



Empathize

To **empathize** means to understand and share the feelings of another. As it relates to the design thinking process and [Project Heart](#), to empathize specifically means to learn about the audience or group that you wish to impact.



Define

**Define** means to share your problem statement with others. As it relates to Project Heart, the define stage of design thinking means you've thought about your personal passions and how to apply the 3Ts of your group to make a greater social impact. The define stage helps you clearly state the need or problem so others can understand.



Ideate

To **ideate** means to form an idea, thought or concept. As it relates to the design thinking process, to ideate specifically means to brainstorm ideas based on what you have learned about your target audience and the point of view or problem statement you have defined. Related to Project Heart, your ideas should also incorporate the specific time, talent and/or treasure that you wish to contribute.



Prototype

To **prototype** means to model or create an example. As it relates to Project Heart, to prototype specifically means to plan out in detail one of your impact project ideas.



Test

To **test** means to check the quality, reliability or performance of something. As it relates to the design thinking process, to test specifically means to gain feedback on your prototype from your target population. As it relates to Project Heart, testing means implementing your plan and reflecting on your success and failures.

## Activity

Use the Design Thinking Process to determine how you can help. The right answer isn't always the first one – even the lanterns Engineering Brightness provides people around the world with today took four previous models to get to where they are. As technology, resources and the needs of people have changed, so have the lanterns. Engineering Brightness went from providing lanterns that require a hand crank to turn on, all the way to its current version - an internal solar panel with batteries to sustain the charge! We want to know how YOU can take your skills, your passions and your talents to help end light poverty.

When you decide on an idea, remember you can access the Illumination Fund for materials funding or a matching donation to a U.S. based non-profit to bring your idea to life! Just visit:

<https://myprojectheart.org/illumination-fund>



**Empathize**



**Define**



**Ideate**



**Prototype**



**Test**

**Reflect**