

**Light & Shadow**  
2019-2020 STEM Scale-Up Program

**Grade Levels:** PreK-2, available in school and out of school

**Website:** <https://regentsctr.uni.edu/>

**Award Provides:**

- A kit that includes a large floor screen and small table screen, a variety of light sources (LED work lights, Maglites, light boards, etc.) a variety of materials (translucent, opaque, and transparent) to interact with light and shadow
- Wooden storage cart for Light & Shadow materials
- Print resources for learning about the science of light and shadow, and how to set up a light and shadow center in a classroom or informal setting
- **High quality professional learning taught by degreed early childhood master teachers with classroom experience**
- One UNI graduate or undergraduate credit (based on educator's needs)
- Educator stipend/sub-pay (\$120 per day) to attend professional development (must attend **both** days to get stipend)

**Testimonial from Past Scale Up Participant:**

*"Your professional learning changed my approach to teaching. I notice it in the observations I make, and in the questions I ask. I notice it in my conscious decisions not to help them too much, fix it for them, or tell them the answer. It has been a wonderful experience for me professional and for our students!"*

**Program Summary**

Technology has been defined by the National Academy of Engineering as "any modification of the natural world done to fulfill human needs or desires." In Light & Shadow (L&S), students construct the technology of shadows to make an object interact with light in an interesting way. Through construction, they **engage in the processes of engineering design** and **grapple with the constraints of physics** to cast different kinds of light and/or develop shadows using a variety of objects, screens and light sources. In the act of shadow construction, students **engage in the mathematics of spatial thinking, geometry and measurement**. Students **collect and compare data**, providing a meaningful context to address **Iowa Core Literacy Standards of Language, Speaking and Listening, and Writing**. Students participate in conversations about object properties, light and design. They recount their construction experiences with appropriate facts and relevant descriptive details. They encounter unknown and multiple-meanings of words and phrases as they seek to explain and **engage in scientific argumentation**. Students develop **21st Century Skills such as creativity and innovation** when they create new and worthwhile ideas to explore light to create shadows. **Civic Literacy** is experienced as they co-create rules and management systems for working within L&S investigations. Students are nurtured in **Life and Career Skills** as they work independently to pursue a design goal, and interact with others to problem solve. Rather than learning *about* productivity and accountability, students are immersed in an atmosphere where *these traits are practiced and developed*. As a result, L&S is a fully integrative STEM activity that meets many **Iowa Early Learning Standards and Next Generation Science and Engineering Standards**.

**Requirements to Implement the Program:**

Educator(s) must attend 2 six-hour days of professional development (one before the school year where educator receives materials, one after implementation begins) and a minimum of 3 hours of online interaction. A memorandum of understanding signed by the building administrator is required before training or materials can be delivered.

**Professional Development:**

Research shows preschool and primary grade teachers are uncomfortable teaching science content, particularly physical science content. **L&S professional learning is structured to allow teachers to explore the same materials that will be provided to their students**. Like their students, they are encouraged to explore features of light and shadows. In the process of manipulating light and shadow, concepts in physics are revealed or revisited. **Teachers learn to view technology as more than computers or electronic devices, and begin to value students' creative endeavors to explore shadows as opportunities to nurture the next great inventor**. L&S professional learning introduces engineering's simple definition of "design under constraint." This encourages teachers to re-envision (re-engineer) their physical classroom, routines and time schedules under state and district constraints to optimize their students' learning. **As a result, standards in engineering and physical science become more relevant and authentic in their work with students and teachers discern many opportunities for addressing literacy, math and 21st Century skills**. L&S professional learning assists teachers in documenting children's growth in inquiry and engineering practices. Throughout the fall semester, teachers will have the opportunity to engage in online professional learning communities, sharing photos, video, experiences and successes.  
**Duration:** 2 six-hour days plus communicating with peers and instructor through social media  
**Date(s):** First date on weekday in summer, second date on a Saturday after school begins  
**Location:** In your STEM Hub area at a place to be determined