

Light & Shadow 2021-2022 STEM Scale-Up Program

Grade Levels: PreK-3, available in school or out of school

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

Video Link: <https://drive.google.com/file/d/13b2FJRxrMTbGsvAyW-9j5s9BoNTDL2XI/view?usp=sharing>

Award Provides:

- Classroom kit with a large floor screen, small table screen, a variety of light sources and materials
- Wooden storage cart for materials
- Teacher's Guide
- 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 of \$240

Additional Cost(s) to Awardee In 2021-2022:

Travel to and from professional learning sessions

Approximate Sustainability Cost After Award Period:

Materials are non-consumable and will last for years with typical classroom use.

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 fulfill their human need or want 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**. In L&S students collect and compare data, instilling a desire to communicate through print, speaking and listening. **This garners their interest to master print concepts, develop phonological awareness, and phonics and word fluency**. Students participate in conversations about object properties, light, reflection 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**.

What is Required to Implement the Program:

Educator(s) must attend 2 six-hour days of highly interactive professional development (one before the start of the school year when the educator receives the classroom kit, one in the fall after implementation begins) and a minimum of 3 hours of online interaction with peers and Instructor throughout the fall semester. Educators must participate in the Iowa STEM Council program evaluation.

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**. In the process of manipulating light and shadow, concepts in physics are revealed/revisited. **Teachers learn to view technology as more than computers or electronic devices, and begin to value students' creative endeavors to explore L&S as opportunities to nurture the next great inventor**. L&S professional learning introduces engineering's simple definition of "design under constraint." This definition 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 to assist each other in problem solving obstacles in implementing high quality STEM experiences in their settings.

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

STEM Scale-Up Program Application Link: www.iowaSTEM.org/Scale-Up-Application