

# Shadow and Light Exploration

Young children have a natural curiosity and interest in exploring light and shadow. When we, as educators, facilitate these explorations, we provide children with the opportunity to engage in several Scientific and Engineering Practices (SEPs) and Cross-Cutting Concepts (CCCs). Consider the following scenario:

*A teacher places a flashlight and variety of transparent, translucent, and opaque materials on a table next to a large blank wall. Two children enter the science area. They turn on the flashlight and point it at different objects. They notice (observing) that when it is pointed at one another, sometimes they see a shadow and sometimes they do not. They wonder why (Asking questions and defining problems). They continue to move around and shine the flashlight on one another (planning and carrying out investigations) and come to the determination that when they are between the wall and the light, they see a shadow (analyzing and interpreting data). They dance around and observe their shadows moving (cause and effect). They notice some green in one child's shadow. The teacher states "I notice you are looking at the green in your shadow. How can you find out where the green is coming from?" (asking questions and defining problems). They continue to watch the green in the shadow as they move (planning and carrying out investigations). Eventually, they make the connection between the green in one child's bracelet and the green in the shadow. They take the flashlight and hold it close to the bracelet and see the green against the wall (explanations based on evidence).*

The opportunity to explore over an extended time and engage in multiple SEPs along with facilitation by the educator to support these investigations and make CCCs visible to the children is what deepens their understanding of light and shadow. Supporting the educator's role in connecting, deepening, and extending this understanding is facilitated by a developmental progress as to how children understand shadow and light (DeVries, R., 1986):



Level 0: Children have little or no awareness of shadows.

Level 1: Children focus on the object and shadow relationship. Children begin to notice that the shadow is the shape of the object. They begin to investigate what happens as they move the object closer or further from the light but do not yet understand the purpose the light plays.

Level 2: Children become aware that light is a needed element in making a shadow. The idea of how light makes something dark is still not understood.

Level 3: Children begin to understand that a shadow (or the darkness) is caused by the object blocking the light. They gain understanding of the spatial relationship between light and the object and how moving the object, or light, changes the shadow. Children still may think that shadows still exist when they do not see them anymore.

Level 4: Children now understand that shadows are the absence of light. They now know that shadows do not exist when they cannot see them.

Consider experiences that allow you to connect, deepen and extend children's understanding of shadow and light in your classroom.

- What materials could you provide?
- What light sources could you use?
- What vocabulary could you introduce?
- How might you ensure children of various ages and abilities can access this experience?

## Key concepts:

*Transparent:* an object that allows light to go through fully.

*Translucent:* an object that lets only some light through.

*Opaque:* an object that does not allow any light through.

