

Shadows

Purpose of Study of Shadows

Exploration of shadows is especially appropriate for young children because children are often intrigued by shadow phenomena. Shadows are mysterious—they come and go; appear sometimes in front of us, sometimes behind, sometimes on the ceiling, sometimes singly, sometimes in pairs; can be tall or short, partial or complete—and yet they are a part of children's everyday experiences.

Unlike other objects in the physical realm, shadows can be acted upon at a distance, and do not require direct contact to be moved. In fact, all of the usual ways of moving something—pushing, pulling, throwing, and so forth—do not work with shadows. In order to act on a shadow, children must learn to coordinate relationships between the light source, the object casting the shadow, and the surface upon which the shadow is being cast (the screen). This coordination of relationships can be very challenging to young children who tend to focus on only one aspect of the shadow at a time. But classroom activities can be structured to help children pay attention to and eventually control the multiple factors involved in creating and experimenting with shadow phenomena. Children can extend shadows experimentation and exploration into rich long-term projects that integrate math, science, literacy, and the arts.

Beginning the Study of Shadows

One way to begin shadow activities is to capture children's interest by drawing attention to shadows in the environment. For example, in taking a walk, you can point out, "Our shadows were in front of us when we left, but are behind us now. I wonder how that happened? How can we get our shadows in front of us again?" Or you might ask children at group time, "What is a shadow?" "What do you have to do to make a shadow?" Group discussions can help you discover children's spontaneous ideas about shadows. These ideas will suggest different directions for activities.

Free exploration is often the best place to start with shadows. All that is needed is a light source and a surface on which to project shadows. While the sun will make shadows, a stronger light source such as a slide projector makes clearer, more distinct shadows. Children can use their bodies to make and manipulate shadows, learning how to make shadows larger and smaller by moving closer to and farther away from the light source. Providing children with various objects to see what kinds of shadows they make can introduce additional problems. "Will you be able to see the dots on the die's shadow?" Children are often surprised that details are not visible on shadows.

Shadow puppets

Making shadow puppets to use in putting on a puppet play is an excellent way to integrate science, literacy, and the arts into a child-directed activity. In figuring out how to make shadow puppets, children have the opportunity to discover for themselves many of the characteristics of shadow phenomena. For example, young children invariably decorate their shadow puppets, only to discover that the decorations don't show up in the shadow. Through experimentation, they learn that the best way to make eyes on a shadow puppet is to poke a hole for the light to shine through. This discovery leads children to thinking more precisely about the role of the light in shadows.

Extending Shadows Study into a Project

When embarking on a project, a good way to begin is to make a web. Some teachers web with children in three categories: What do we know? What are our questions? What do we want to do? A kindergarten class asked the following questions about shadows:

- Do see-through things make shadows?
- Do fish make shadows in the water? How?
- Do shadows talk?
- Where do shadows go when the sun goes behind a cloud?
- How does something make two shadows?

As the children discovered and filled in answers to some of their questions, they identified new questions, which they added to their web.

Principles of Teaching

1. Find out children's spontaneous ideas about shadows.
2. Find out what children wonder about shadows.
3. Help children observe shadow phenomena by calling attention to subtleties in shadow effects.
4. Control variables so children can experiment more systematically and will be more apt to observe regularities (for example, by providing a stationary light source with a moveable object or a moveable light source with a stationary object).
5. Get children to make predictions about shadows.
6. Help children become conscious of contradictions between their expectations of shadows and what happens.
7. Suggest effects that children might want to produce.
8. Support children's ideas.

Goals

(listed in a developmental sequence from less to more advanced)

1. For children to notice the correspondence between an object and its shadow.
2. For children to become aware of the necessity for light in the creation of shadows.
3. For children to become able to coordinate the spatial relationships of light, object, and screen, at least through trial-and-error.
4. For children to understand that light plays an active role in the formation of shadows.
5. For children to know how to manipulate light sources, objects, and screens to produce shadows on various screens (without trial-and-error).
6. For children to be able to explain the formation of shadows as an interaction of light, object, and screen.
7. For children to understand that shadows are the absence of light, and therefore that an unseen shadow (such as a merged shadow) does not exist.

Children's Books Containing Shadow Themes

In Shadowland by Mitsumasa Anno

Bear Shadow by Frank Asch

Shadowville by Michael Bartalos

Me and My Shadow by Arthur Dorros

The Biggest Shadow in the Zoo by Jack Kent

Dark as a Shadow by Lawrence Lowery

Nothing Sticks like A Shadow by Lynn Munsinger

I Have a Friend by Keiko Narahashi

Shadows are About by Ann Whitford Paul

Let's Try It Out. . .Light and Dark by Seymour Simon